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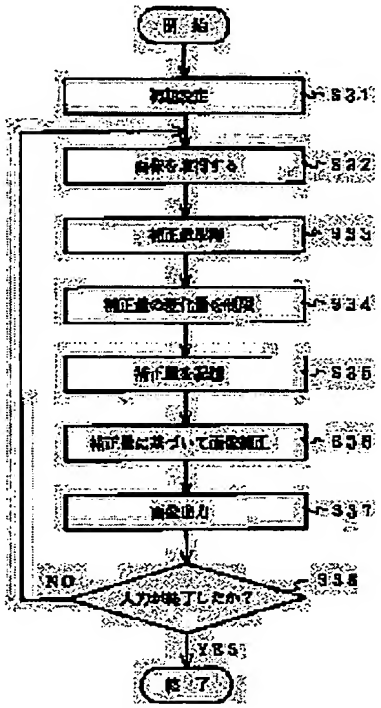
(54) VIDEO PROCESSING UNIT, VIDEO DISPLAY DEVICE AND VIDEO PROCESSING METHOD USED FOR THE SAME, AND ITS PROGRAM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a video processing unit that can automatically attain high image quality for a moving picture adaptively independently of a video source or a scene without causing flickers.

SOLUTION: A correction amount update decision means 25 checks whether or not a correction amount is to be updated based on an input image obtained from an image input means 1. If a cut point is detected or number of frames in a frame number storage section 32 exceeds a prescribed value, it is determined that the update is required. In this case, a correction amount acquisition means 21 acquires a new correction amount on the basis of the input image. If no cut point is detected, a temporal change of the correction amount is limited and a correction amount storage section 31 stores the result. An image correction means 23 applies high image quality correction to the input image based on the correction amount recorded in the correction amount storage section 31. Then the image after the correction is fed to an image output means 4.



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CLAIMS

[Claim(s)]
[Claim 1] An image processor characterized by having an amount acquisition means of amendments to acquire the amount of amendments from a dynamic image by which a sequential input is carried out, and an image amendment means to perform high definition-ized amendment to an input dynamic image based on the amount of amendments acquired with said amount acquisition means of amendments.
[Claim 2] The image processor which carries out [having an image input means acquire a frame image from a dynamic image by which a sequential input is carried out, an amount acquisition means of amendments acquire the amount of amendments from a frame image acquired with said image input means, and an image amendment means perform high-definition-ized amendment to a frame image based on the amount of amendments acquired with said amount acquisition means of amendments, and] as the feature.
[Claim 3] An image processor according to claim 1 or 2 characterized by including an image composition means to compound a non-amending object domain which is the remaining portion when starting an amendment object domain started with an amendment field logging means which starts an amendment object domain from the dynamic image concerned, and said amendment field logging means, and the amendment object domain concerned before performing amendment processing to said dynamic image.
[Claim 4] An image processor according to claim 2 characterized by including an amount change limit means of amendments to restrict variation with the amount of amendments of a frame image before having memorized the amount of amendments of the present frame image obtained with said amount acquisition means of amendments.
[Claim 5] An image processor according to claim 2 or 4 characterized by providing the following A fixed time amount progress detection means to judge whether a frame number from a frame image with which said amount of amendments was updated at the end to the present frame image was counted, and the frame number concerned exceeded constant value A renewal decision means of the amount of amendments to direct renewal of said amount of amendments when judged with fixed time amount having passed with said fixed time amount progress detection means
[Claim 6] An image processor according to claim 2 or 4 carried out [including a cut inspection appearance means detect a cutting point which shows instead of / OFF / of a scene in said dynamic image / based on change of characteristic quantity called for from each frame image, and a renewal decision means of the amount of amendments direct renewal of said amount of amendments when said cutting point is detected by said cut inspection appearance means, and] as the feature.
[Claim 7] An image processor according to claim 2 or 4 characterized by providing the following A fixed time amount progress detection means to judge whether a frame number from a frame image with which said amount of amendments was updated at the end to the present frame image was counted, and the frame number concerned exceeded constant value A cut inspection appearance means to detect a cutting point which shows instead of [OFF / of a scene in said dynamic image] based on change of characteristic quantity called for from each frame image A renewal decision means of the amount of amendments to direct renewal of said amount of amendments when either of fixed passage-of-time detection by said fixed time amount progress detection means and detection of said cutting point by said cut inspection appearance means is performed
[Claim 8] For said image amendment means, claim 1 to claim 7 characterized by including an amendment means of n kinds (n>=1) of arbitration is the image processor of a publication either including an amount calculation means of amendments by which said amount acquisition means of amendments computes the amount of amendments of n kinds (n>=1) of arbitration.
[Claim 9] Claim 2 to claim 7 characterized by providing the following is the image processor of a publication either. Said amount acquisition means of amendments is an amount calculation means of white balance amendments to compute the amount of white balance amendments of said dynamic image. An amount calculation means of contrast

amendments to compute the amount of contrast amendments of said dynamic image An amount calculation means of saturation amendments to compute the amount of saturation amendments of said dynamic image An amount calculation means of exposure amendments to compute the amount of exposure amendments of said dynamic image, and an amount calculation means of sharpness amendments to compute the amount of sharpness amendments of said dynamic image, At least one of desirable amount calculation means of color correction to compute the desirable amount of color correction which shows the amount of amendments to a desirable color beforehand set up in said dynamic image is included. Said image amendment means A white balance amendment means to perform white balance amendment of said dynamic image corresponding to said amount acquisition means of amendments, A contrast amendment means to perform contrast amendment of said dynamic image, and a saturation amendment means to perform saturation amendment of said dynamic image, At least one of an exposure amendment means to perform exposure amendment of said dynamic image, a sharpness amendment means to perform sharpness amendment of said dynamic image, and desirable color correction means to perform said desirable color correction of said dynamic image

[Claim 10] Said image amendment means is the image processor according to claim 9 characterized by to amend based on the amount of amendments computed with said amount acquisition means of amendments to a dynamic image amended with an image amendment means of the preceding paragraph, and for said amount acquisition means of amendments to compute said amount of amendments from the dynamic image amended with the image amendment means corresponding to the amount acquisition means of amendments of the preceding paragraph.

[Claim 11] Said amount acquisition means of amendments is an image processor according to claim 9 or 10 characterized by including an appraisal universe logging means which starts an assessment image field for computing the amount of amendments from said frame image.

[Claim 12] Said amount acquisition means of amendments is an image processor according to claim 9 or 10 characterized by including a upper-limit adjustment means to replace the amount of amendments acquired in advance with the set point beforehand defined when a value was [/ upper limit] larger than said upper limit.

[Claim 13] Said amount change limit means of amendments is the image processor of a publication of claim 4 to claims 7, claims 8, and claims 12 which are characterized by including a variation calculation means to compute variation of the amount of the newest amendments, and the amount of amendments of a before frame, and a variation limit means to restrict variation of said amount of amendments based on the maximum change width of face either.

[Claim 14] Said cut inspection appearance means is an image processor according to claim 6 or 7 characterized by constituting so that a result of having compared a color histogram created based on color information on each pixel of said dynamic image for every frame may be made into characteristic quantity and a cutting point of said dynamic image may be detected based on change of characteristic quantity of a parenthesis.

[Claim 15] Said cut inspection appearance means is an image processor according to claim 14 characterized by constituting so that said color histogram may be created, after thinning out an image at a fixed gap, in case said color histogram is created from said dynamic image.

[Claim 16] An image processor characterized by having a cut inspection appearance means to detect a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be an image input means to acquire a frame image from a dynamic image by which a sequential input is carried out based on change of characteristic quantity called for from each frame image.

[Claim 17] Said cut inspection appearance means is an image processor according to claim 16 characterized by constituting so that a result of having compared a color histogram created based on color information on each pixel of said dynamic image for every frame may be made into characteristic quantity and a cutting point of said dynamic image may be detected based on change of characteristic quantity of a parenthesis.

[Claim 18] Said cut inspection appearance means is an image processor according to claim 17 characterized by constituting so that said color histogram may be created, after thinning out an image at a fixed gap, in case said color histogram is created from said dynamic image.

[Claim 19] The graphic display device characterized by to have an amount acquisition means of animation amendments acquire the amount of amendments of N class (N>=1) from the dynamic image by which a sequential input is carried out, an image amendment means perform high-definition-ized amendment of N class (N>=1) to said dynamic image based on the amount of amendments acquired with said amount acquisition means of animation amendments, and an image-display means display the dynamic image amended with said image amendment means.

[Claim 20] An image art characterized by having a step which acquires the amount of amendments from a dynamic image by which a sequential input is carried out, and a step which performs high definition-ized amendment to said input dynamic image based on the acquired amount of amendments.

[Claim 21] An image art characterized by having a step which acquires the amount of amendments from each frame

image which constitutes a dynamic image by which a sequential input is carried out, and a step which performs high definition-ized amendment to said frame image based on the acquired amount of amendments.
[Claim 22] An image art according to claim 20 or 21 characterized by including a step which updates the amount of amendments in every N frame (N>=1).
[Claim 23] An image art according to claim 20 or 21 characterized by including a step which updates the amount of amendments when a cutting point which said input dynamic image is investigated for every frame, and shows instead of [OFF / of a scene in said input dynamic image] is detected.
[Claim 24] An image art according to claim 20 or 21 characterized by including a step which updates the amount of amendments when a cutting point of investigating said input dynamic image for every frame, and indicating instead of [OFF / of a scene in said input dynamic image] to be the step which updates the amount of amendments on every N frame (N>=1) is detected.
[Claim 25] Claim 20 to claim 24 characterized by including a step which performs high definition-ized amendment of n kinds (n>=1) of arbitration to said input dynamic image a step which acquires the amount of amendments of n kinds (n>=1) of arbitration in case said amount of amendments is acquired from said input dynamic image, and based on the calculated amount of amendments is the image art of a publication either.
[Claim 26] Claim 21 to claim 24 characterized by providing the following is the image art of a publication either. A step which acquires said amount of amendments is a step which computes the amount of white balance amendments of said dynamic image. A step which computes the amount of contrast amendments of said dynamic image A step which computes the amount of saturation amendments of said dynamic image A step which computes the amount of exposure amendments of said dynamic image, and a step which computes the amount of sharpness amendments of said dynamic image, A step which performs said high definition-ized amendment including at least one of steps which compute the desirable amount of color correction which shows the amount of amendments to a desirable color beforehand set up in said dynamic image A step which performs white balance amendment of said dynamic image corresponding to a step which acquires said amount of amendments, At least one of a step which performs contrast amendment of said dynamic image, a step which performs saturation amendment of said dynamic image, a step which performs exposure amendment of said dynamic image, a step which performs sharpness amendment of said dynamic image, and steps which perform said desirable color correction of said dynamic image
[Claim 27] A step which performs said high definition-ized amendment amends based on the amount of amendments computed at a step which acquires said amount of amendments to a dynamic image amended at a step which performs high definition-ized amendment of the preceding paragraph. A step which acquires said amount of amendments is an image art according to claim 26 characterized by computing said amount of amendments from a dynamic image amended at a step which performs said high definition-ized amendment corresponding to a step which acquires the amount of amendments of the preceding paragraph.
[Claim 28] An image art according to claim 26 or 27 characterized by including a step which restricts variation with the amount of amendments of a frame before having memorized the amount of amendments of the acquired present frame.
[Claim 29] Claim 26 to claim 28 characterized by including a step which starts an assessment image field required in order to acquire said amount of amendments from said frame image, and a step which acquires said amount of amendments from the cut-down assessment image is the image art of a publication either.
[Claim 30] An image art according to claim 23 or 24 characterized by including a step which makes characteristic quantity a result of having compared that color histogram created based on color information on each pixel of said frame image when detecting said cutting point for every frame, and detects a cutting point of a dynamic image based on change of characteristic quantity of a parenthesis.
[Claim 31] An image art according to claim 30 characterized by including a step which creates said color histogram after thinning out an image at a fixed gap, in case said color histogram is created from said frame image, when detecting said cutting point.
[Claim 32] A step which starts an amendment object domain from the dynamic image concerned before performing amendment processing to said dynamic image, when a dynamic image is flowing to a part in the screen concerned like a screen of a personal computer, A step which performs image amendment to the cut-down image for amendment, Claim 20 to claim 31 by which it is including [a step which a non-amending object domain which is the remaining portion when starting an amendment object domain where said image amendment was performed, and the amendment object domain concerned is made to rival, and outputs an image] characterized is the image art of a publication either.
[Claim 33] An image art characterized by having a step which detects a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be the step which acquires a frame image from a dynamic image by which a sequential input is carried out based on change of characteristic quantity called for from each frame image.

[Claim 34] A step which detects said cutting point is an image art according to claim 33 characterized by making into characteristic quantity a result of having compared a color histogram created based on color information on each pixel of said dynamic image for every frame, and detecting a cutting point of said dynamic image based on change of characteristic quantity of a parenthesis.
[Claim 35] A step which detects said cutting point is an image art according to claim 34 characterized by creating said color histogram after thinning out an image at a fixed gap, when creating said color histogram from said dynamic image.

[Claim 36] The program for performing the processing which acquires the one or more amounts of amendments to a computer from the dynamic image by which a sequential input is carried out, the processing which control change of the amount of amendments as compared with the amount of amendments which was able to obtain that acquired amount of amendments from one or more frames in front of the one or more past, and the processing which perform high-definition-ized amendment based on this controlled amount of amendments at a frame image.
[Claim 37] Processing which acquires the one or more amounts of amendments from a dynamic image by which a sequential input is carried out to a computer, Processing which detects a cutting point which shows instead of [OFF / of a scene in the dynamic image concerned] based on change of characteristic quantity for which it asked from a frame image of an inputted dynamic image, A program for performing processing which controls variation of the amount of amendments in consideration of existence of a cutting point [the amount of amendments which was able to obtain the acquired amount of amendments from one or more frames in front of the one or more past], and processing which performs high definition-ized amendment to a frame image based on this controlled amount of amendments.
[Claim 38] A program for performing processing which detects a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be the processing which acquires a frame image from a dynamic image by which a sequential input is carried out to a computer based on change of characteristic quantity called for from each frame image.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the method of high-definition-izing especially image quality of a dynamic image automatically about the program in the image art list used for an image processor, a graphic display device, and it.
[0002]
[Description of the Prior Art] High definition-ization of an image means performing image amendment processing to a former image so that a still picture and an animation may be looked more finely. For example, saturation amendment, gamma amendment, etc. are amendment processings of these high-definition-izing.
[0003] Saturation amendment is amendment which adjusts the saturation showing the thickness of a color. Since people like an image with higher saturation in many cases, they adjust by saturation amendment in many cases so that the saturation of a former image may become high. gamma amendment is amendment which adjusts the brightness of an image. People like neither a too dark image nor a too bright image, but like the image used as proper brightness more. gamma amendment adjusts such brightness.
[0004] The thing there are various amendments besides these and an image is made to look more beautiful using these amendment processings is high definition-ized processing. As a method of high-definition-izing the above images, the following methods are used conventionally.
[0005] When high-definition-izing a static image, the various still picture automatic high definition-ized technique is used. as the still picture high definition-ized technique here -- "an automatic image quality improvement of the color picture by adjustment of saturation, contrast, and sharpness" (Inoue --) Tajima, the 24th image-engineering conference collected works, and 3- with the technique indicated by 3 and 1993 (reference 1) The technique indicated by JP,09-147098,A (reference 2) and the technique indicated by JP,10-150566,A (reference 3), There is technique indicated by "the automatic color correction method of realizing desirable color reproduction" (12 Tsukada, Funayama, Tajima, color forum JAPAN2000 collected works, pp.9- 2000) (reference 4).
[0006] By the automatic high definition-ized technique indicated by these reference, a certain characteristic quantity is extracted from the input image which consists of a static image, the amount of amendments is determined based on the characteristic quantity, and high definition-ized amendment is performed. Characteristic quantity here is the average luminance of the dark field for example, in a screen, or is the average gradation value of each RGB (R: red, G:green, B:blue) in the bright field in a screen.
[0007] An example of each amendment technique is explained below at details. An example of the method of realizing saturation amendment is shown in drawing 28 . By the method of realizing this saturation amendment, a histogram is created about S value using HSV (Hue Saturation Vlue) system of coordinates etc. to the input image first shown in drawing 28 (a) [refer to drawing 28 (b)]. Here, HSV system of coordinates are indicated by "Color Gamut Transformation Pairs" (19 A. R.Smith, Computer Graphics, vol. 12 and pp.12- 1978).
[0008] The S value of HSV system of coordinates expresses saturation, and the histogram of S value can be called histogram of saturation. The surface ratio to the total number of pixels makes the high saturation portion used as the fixed rate a a high saturation field among the histograms created here. And the average saturation SAF of this high saturation field is computed [refer to drawing 28 (b)]. This average saturation SAF to the amount Copt of amendments Copt =SAFopt / SAF .... (1)
It computes by the formula to say. Here, it is the average saturation SAFopt. The optimum value which the saturation image of an input image can take is expressed.
[0009] Thus, the computed amount Copt of amendments The more a value becomes large, the more saturation will be

emphasized [refer to drawing 28 (c)]. c0 in drawing the value when extending a value to the limit of the range which can take the range of the saturation S of an input image -- it is -- c=c0 it is -- if -- [refer to drawing 28 (d)]. [the saturation S of an input image will spread to the limit of a range like drawing 28 (c) to refer to]

[0010] High definition-ization of an image calculates S value from the RGB value of each pixel of a frame image, and is this. S'=Copt xS .... Linear transform is carried out by the formula (2). The image after amendment is completed by returning to a RGB value again after conversion. The above-mentioned saturation amendment is indicated by reference 1.

[0011] An example of the method of realizing exposure amendment is shown in drawing 29 . By the method of realizing this exposure amendment, the histogram of Y value is created using XYZ system of coordinates to the input image first shown in drawing 29 (a) [refer to drawing 29 (b)]. Y value expresses brightness and the histogram of Y value can be called brightness histogram.

[0012] At this time, it is Zmin about the m-th brightness value in the m-th brightness value from the one where Zmax and brightness are lower from the one where brightness is higher, using a times of the number of pixels as m. It carries out and is the mean value M of a histogram. M= (Zmax+Zmin)/2 .... (3)

It asks by the formula to say.

[0013] A mean value M is the value M0 of the one half of a dynamic range after conversion. Gamma value which becomes gamma= [log (255/M0)] /[log (255/M)]

.... (4)

It can be found by the formula to say.

[0014] Exposure amendment is [the gamma value which calculated Y value from the RGB value of each pixel of a frame image first, and was calculated by (4) formulas from the value, and] [Equation 1].

$$Y = \frac{255}{255^{\gamma}} Y^{\gamma}$$

.... (5)

It realizes by performing a gamma correction to an input image using the formula to say [refer to drawing 29 (c) and (d)]. The above-mentioned exposure amendment is indicated by reference 3.

[0015] An example of the method of realizing white balance amendment is shown in drawing 30 . By the method of realizing white balance amendment, a brightness histogram is created using XYZ system of coordinates etc. to the input image first shown in drawing 30 (a) [refer to drawing 30 (b)].

[0016] Let the average of each gradation value of a pixel with the brightness from the one where brightness is higher to the m-th be the white point of that image at this time, using a times of the number of pixels as m. This white RGB value is set to (wr, wg, wb), the white RGB value after adjustment is set to (wr0, wg0, and wb0), and they are the amounts r, g, and b of white balance amendments. r=wr0 / wr g=wg0 / wg b=wb0 / wb .... (6)

It asks by the formula to say.

[0017] This amount of amendments R'=rxR G'=gxG B'=bxB .... (7)

From the formula to say, as shown in drawing 30 (c), white balance amendment is realized by carrying out linear transform of each gradation value. The above-mentioned white balance amendment is indicated by reference 2.

[0018] An example of the method of realizing contrast amendment is shown in drawing 31 . By the method of realizing contrast amendment, it creates using XYZ system of coordinates etc. to the input image first shown in drawing 31 (a) [refer to drawing 31 (b)]., the histogram, i.e., the brightness histogram, of Y value

[0019] Average luminance Vmax of the pixel which sets a times of the number of pixels to m, and has the brightness from the one where brightness is higher to the m-th at this time It asks. Average luminance Vmin of the pixel which similarly has the brightness from the one where brightness is lower to the m-th It asks [refer to drawing 31 (b)].

[0020] It is the straight line which passes a coordinate (Vmin, 0), and (Vmax and 255) from these. V'=axV+b .... (8)

It asks for the formula to say. Here, V expresses the brightness Y value of the pixel of a former image, and V' is Y value of the pixel after conversion. Linear transform of the brightness of each pixel is carried out using this (8) type, and contrast stretching is realized by transforming inversely to a RGB value. The above-mentioned contrast amendment is indicated by reference 1.

[0021] An example of the method of realizing sharpness amendment is shown in drawing 32 . By the method of realizing sharpness amendment, a high-pass filter is covered to the input image first shown in drawing 32 (a), and as shown in drawing 32 (b), an edge component is extracted. They are [ss / E / a high-pass filter and / (V)] brightness and ESopt about the area of an edge field, and V in an edge field and AE (V). When it is the optimal sharpness of the image,

the amount k of sharpness amendments is [Equation 2].

$$k = \frac{ES_{opt} \cdot A_E(V') - \iint_{E(V')} |V \otimes ss| dxdy}{\iint_{E(V)} |V \otimes ss \otimes ss| dxdy}$$

.... (9)

It can be found by the formula to say.

[0022] Using k which was able to be found by this (9) type, sharp-ization is [Equation 3].

$$V' = V + k(V \otimes ss)$$

.... (10)

It is carried out by the formula to say. Sharp-ized amendment is realized by transforming a RGB value inversely from V' for which it asked by this (10) type. The above-mentioned sharpness amendment is indicated by reference 1.

[0023] An example of the method of realizing desirable color correction is shown in drawing 33 . Desirable color correction makes more desirable vanity (it is based on human being's perception it is the same as that of the following which shows the vanity) of the color of an image by bringing close to the memory color of the object in which human being has the color of an image. The concrete processing of an example shown in drawing 33 is as follows.

[0024] The hue of each pixel of the frame image shown in drawing 33 (a) is calculated, and the histogram of a hue as shown in drawing 33 (b) is created. The color correction parameter which has given this histogram in advance according to each division hue field as shown in drawing 33 (c) is applied, and flesh color, azure, and the hue that is related green [vegetation] are amended to the hue used as a more desirable color.

[0025] Consequently, as shown in drawing 33 (d), only flesh color, azure, and the green color of vegetation change, and it has a more desirable color. Desirable color correction is realized by performing such processing. This desirable color correction is for realizing the color which looks at only the amended image and is sensed that human being is desirable, and the pile of old know how is accumulated in the data base, and it is carried out based on the content accumulated in that data base. In addition, the above-mentioned desirable color correction is indicated by reference 4.

[0026] High definition-ization of a still picture is realized by using the still picture automatic high definition-ized technique which was mentioned above. When high-definition-izing a dynamic image, the method of performing high definition-ization using a fixed parameter is used. With a fixed parameter, when performing amendment in a dynamic image, the amount parameter of amendments is fixed to a certain constant value. For example, there is the following in a fixed parameter.

[0027] As shown in drawing 34 , the image which amended by changing the gamma value which is the parameter of the gamma correction of various (5) types is created, and the optimum value of the gamma value an image appears more finely is calculated by subjectivity assessment experiment by comparing each. When applying this gamma amendment to a dynamic image and amending using the optimal gamma value, without fluctuating a gamma value, it can be said that this gamma value is a fixed parameter. What high-definition-izes an image by using such a fixed parameter not only in gamma amendment but in various amendment processings is used for high definition-ized processing of a dynamic image.

[0028]

[Problem(s) to be Solved by the Invention] However, by the conventional system mentioned above, since the amount of amendments is given with the fixed parameter, by the high definition-ized technique of a dynamic image, the amount of amendments cannot be changed accommodative according to the photography condition of the image source or an image.

[0029] As for the dynamic image, the image quality of an image changes greatly with the image sources and photography conditions. If it says by the difference in the image source, the saturation of the dynamic image obtained from the DVD (Digital VersatileDisc) deck is also high, and contrast has also become height. To it, with the property of a camera, saturation is low and, as for the dynamic image which the individual photoed with a home youth's digital video camera etc., contrast is also low.

[0030] If it says by the difference in a photography condition, saturation will differ from contrast too in the scenery in the clouded sky photoed with the digital video camera, and the scenery in fine weather. Thus, as for the dynamic image, image quality changes greatly with cases.

[0031] On the other hand, although the image of a digital video camera becomes clear if a fixed parameter determines the amount of amendments, a DVD image requires amendment too much and may present unnatural vanity. In this case, although there is also the method of changing manually and using for every image source in quest of a fixed parameter

for every image source, in order for this to be unable to respond to the difference in the image quality by the difference in a photography condition and to have to change it manually, it is inconvenient.
[0032] Then, it is in the object of this invention providing with the program the image art list used for the image processor, the graphic display device, and it which the above-mentioned trouble can be canceled, and the amount of amendments can be changed accommodative according to the image quality of an input dynamic image, and can high-definition-ize a dynamic image automatically.
[0033]
[Means for Solving the Problem] An image processor by this invention is equipped with an amount acquisition means of amendments to acquire the amount of amendments from a dynamic image by which a sequential input is carried out, and an image amendment means to perform high definition-ized amendment to an input dynamic image based on the amount of amendments acquired with said amount acquisition means of amendments.
[0034] Other image processors by this invention are equipped with an image input means acquire a frame image from a dynamic image by which a sequential input is carried out, an amount acquisition means of amendments acquire the amount of amendments from a frame image acquired with said image input means, and an image amendment means perform high-definition-ized amendment to a frame image based on the amount of amendments acquired with said amount acquisition means of amendments.
[0035] Another image processor by this invention is equipped with a cut inspection appearance means to detect a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be an image input means to acquire a frame image from a dynamic image by which a sequential input is carried out based on change of characteristic quantity called for from each frame image.
[0036] The graphic display device by this invention is equipped with an amount acquisition means of animation amendments acquire the amount of amendments of N class (N>=1) from a dynamic image by which a sequential input is carried out, an image amendment means perform high-definition-ized amendment of N class (N>=1) to said dynamic image based on the amount of amendments acquired with said amount acquisition means of animation amendments, and an image-display means display the dynamic image amended with said image amendment means.
[0037] An image art by this invention is equipped with a step which acquires the amount of amendments from a dynamic image by which a sequential input is carried out, and a step which performs high definition-ized amendment to said input dynamic image based on the acquired amount of amendments.
[0038] Other image arts by this invention are equipped with a step which acquires the amount of amendments from each frame image which constitutes a dynamic image by which a sequential input is carried out, and a step which performs high definition-ized amendment to said frame image based on the acquired amount of amendments.
[0039] Another image art by this invention is equipped with a step which detects a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be the step which acquires a frame image from a dynamic image by which a sequential input is carried out based on change of characteristic quantity called for from each frame image.
[0040] The program of the image art by this invention is performing the processing which acquires the one or more amounts of amendments to a computer from the dynamic image by which a sequential input is carried out, the processing which control change of the amount of amendments as compared with the amount of amendments which was able to obtain that acquired amount of amendments from one or more frames in front of the one or more past, and the processing which perform high-definition-ized amendment based on this controlled amount of amendments at a frame image.
[0041] A program of other image arts by this invention Processing which acquires the one or more amounts of amendments from a dynamic image by which a sequential input is carried out to a computer, Processing which detects a cutting point which shows instead of [OFF / of a scene in the dynamic image concerned] based on change of characteristic quantity for which it asked from a frame image of an inputted dynamic image, Processing which controls variation of the amount of amendments in consideration of existence of a cutting point [the amount of amendments which was able to obtain the acquired amount of amendments from one or more frames in front of the one or more past], and processing which performs high definition-ized amendment to a frame image based on this controlled amount of amendments are performed.
[0042] A program of another image art by this invention is performing processing which detects a cutting point of indicating instead of [OFF / of a scene in said dynamic image] to be the processing which acquires a frame image from a dynamic image by which a sequential input is carried out to a computer based on change of characteristic quantity called for from each frame image.
[0043] Namely, an image input means to input a dynamic image in case the 1st image processor of this invention high-definition-izes automatically a dynamic image by which a sequential input is carried out, An amount acquisition means

of amendments to acquire the amount of amendments from an input dynamic image in order to high-definition--ization-amend an input dynamic image, It is characterized by having an image amendment means to perform high definition-ized amendment to an input dynamic image based on the amount of amendments acquired by the amount acquisition means of amendments, and an image output means to output an amended dynamic image.

[0044] An image input means to acquire a frame image from a dynamic image in case the 2nd image processor of this invention high-definition-izes automatically a dynamic image by which a sequential input is carried out, An amount acquisition means of amendments to acquire the amount of amendments from a frame image in order to high-definition--ization-amend a frame image, It is characterized by having an image amendment means to perform high definition-ized amendment to a frame image based on the amount of amendments acquired by the amount acquisition means of amendments, and an image output means to output an amended frame image.

[0045] Before the 3rd image processor of this invention performs amendment processing to an input image in addition to a configuration of the above 1st and the 2nd image processor, it is characterized by to have an image composition means to compound an amendment field logging means which starts an amendment object domain from an input image, and a non-amending object domain which is the remaining portion when starting an amendment object domain and an amendment object domain.

[0046] In case the 4th image processor of this invention high-definition-izes automatically a dynamic image by which a sequential input is carried out, before having memorized the amount of amendments of the present frame image obtained by the amount acquisition means of amendments in addition to a configuration of the 2nd above-mentioned image processor, it is characterized by having an amount change limit means of amendments to restrict variation with the amount of amendments of a frame image.

[0047] The 5th image processor of this invention is added to a configuration of the 2nd to 4th above-mentioned image processor. It is characterized by having a fixed time amount progress detection means to judge whether a frame number from a frame image with which the amount of amendments was updated at the end to the present frame image was counted, and a frame number exceeded constant value, and a renewal decision means of the amount of detection amendments to direct renewal of the amount of amendments if fixed time amount passes.

[0048] In addition to a configuration of the 2nd to 4th above-mentioned image processor, the 6th image processor of this invention is characterized by to have a cut inspection appearance means detect a cutting point which shows instead of [OFF / of a screen in a dynamic image] based on change of characteristic quantity called for from each frame image, and a renewal decision means of the amount of amendments direct renewal of the amount of amendments if a cutting point is detected.

[0049] The 7th image processor of this invention is added to a configuration of the 2nd to 4th above-mentioned image processor. A fixed time amount progress detection means to judge whether a frame number from a frame image with which the amount of amendments was updated at the end to the present frame image was counted, and a frame number exceeded constant value, A cut inspection appearance means to detect a cutting point which shows instead of [OFF / of a screen in a dynamic image] based on change of characteristic quantity called for from each frame image, If fixed time amount passes or a cutting point is detected, it is characterized by having a renewal decision means of the amount of amendments to direct renewal of the amount of amendments.

[0050] The 8th image processor of this invention is characterized by having an amount calculation means of amendments by which the amount acquisition means of amendments computes the amount of amendments of n kinds (n>=1) of arbitration, and an image amendment means having an amendment means of n kinds (n>=1) of arbitration in the 1st to 7th above-mentioned image processor.

[0051] The 9th image processor of this invention is characterized by having an amount calculation means of white balance amendments by which the amount acquisition means of amendments acquires the amount of white balance amendments of a dynamic image in the 1st to 7th above-mentioned image processor, and having a white balance amendment means by which an image amendment means performs white balance amendment to a dynamic image, corresponding to it.

[0052] The 10th image processor of this invention is characterized by having an amount calculation means of contrast amendments by which the amount acquisition means of amendments acquires the amount of contrast amendments of a dynamic image from the above 1st in the 7th and 9th image processor, and having a contrast amendment means by which an image amendment means performs contrast amendment to a dynamic image, corresponding to it.

[0053] The 11th image processor of this invention is characterized by having an amount calculation means of saturation amendments by which the amount acquisition means of amendments acquires the amount of saturation amendments of a dynamic image from the above 1st in the 7th, 9th, and 10th image processor, and having a saturation amendment means by which an image amendment means performs saturation amendment to a dynamic image, corresponding to it.

[0054] The 12th image processor of this invention is characterized by having an amount calculation means of exposure amendments by which the amount acquisition means of amendments acquires the amount of exposure amendments of a dynamic image in the 7th [the above 1st to], and the 9th to 11th image processor, and having an exposure amendment means by which an image amendment means performs exposure amendment to a dynamic image, corresponding to it.
[0055] The 13th image processor of this invention is characterized by having an amount calculation means of sharpness amendments by which the amount acquisition means of amendments acquires the amount of sharpness amendments of a dynamic image in the 7th [the above 1st to], and the 9th to 12th image processor, and having a sharpness amendment means by which an image amendment means performs sharpness amendment to a dynamic image, corresponding to it.
[0056] The 14th image processor of this invention is set to the 7th [the above 1st to], and the 9th to 12th image processor. It is characterized by having a desirable amount calculation means of color correction to acquire the desirable amount of color correction which shows the amount of amendments to a desirable color to which the amount acquisition means of amendments was beforehand set in a dynamic image, and having a desirable color correction means by which an image amendment means performs desirable color correction to a dynamic image, corresponding to it.
[0057] The 15th image processor of this invention is characterized by having an appraisal universe logging means by which the amount acquisition means of amendments can start an assessment image field for computing the amount of amendments from a frame image in the 9th to 14th above-mentioned image processor.
[0058] The 16th image processor of this invention is characterized by having a upper-limit adjustment means to replace with the set point the amount of amendments from which the amount acquisition means of amendments was acquired in advance in the 9th to 15th above-mentioned image processor if a value is larger than a upper limit as compared with a upper limit.
[0059] The 17th image processor of this invention is characterized by having a variation calculation means by which the amount change limit means of amendments computes variation of the amount of the newest amendments, and the amount of amendments of a before frame, and a variation limit means to restrict variation of the amount of amendments based on the maximum change width of face in the 7th [the above 4th to], 9th, and 16th image processor.
[0060] In the above 6th and the 7th image processor, the 18th image processor of this invention makes characteristic quantity a result with which a cut inspection appearance means compared a color histogram created based on color information on each pixel of an input image for every frame, and is characterized by detecting a cutting point of a dynamic image based on change of this characteristic quantity.
[0061] In the 18th above-mentioned image processor, the 19th image processor of this invention is characterized by creating a color histogram, after it thins out an image at a fixed gap, in case a cut inspection appearance means creates a color histogram from an input image.
[0062] An image input means to input a dynamic image in case a graphic display device of this invention high-definition-izes automatically a dynamic image by which a sequential input is carried out and displays it, An amount acquisition means of animation amendments to acquire the amount of amendments of N class (N>=1) from an input dynamic image in order to high-definition--ization-amend an input dynamic image, It is characterized by having an image amendment means to perform high definition-ized amendment of N class (N>=1) to an input dynamic image based on the amount of amendments acquired by the amount acquisition means of animation amendments, and an image display means to display an amended dynamic image.
[0063] In case the 1st image art of this invention high-definition-izes an image by which a sequential input is carried out, in order to high-definition--ization-amend an input dynamic image, from an input dynamic image, it acquires the amount of amendments and is characterized by performing high definition-ized amendment to an input dynamic image based on the acquired amount of amendments.
[0064] In case the 2nd image art of this invention high-definition-izes an image by which a sequential input is carried out, from each frame image which constitutes an input dynamic image, it acquires the amount of amendments and is characterized by performing high definition-ized amendment to a frame image based on the acquired amount of amendments.
[0065] In case the 3rd image art of this invention high-definition-izes an image by which a sequential input is carried out, in addition to the above 1st and an image art of 2, it is characterized by updating the amount of amendments on every N frame (N>=1).
[0066] In case the 4th image art of this invention high-definition-izes an image by which a sequential input is carried out, when in addition to the above 1st and an image art of 2 an input dynamic image is investigated for every frame and a cutting point is detected, it is characterized by updating the amount of amendments.
[0067] In case the 5th image art of this invention high-definition-izes an image by which a sequential input is carried out, in addition to the above 1st and an image art of 2, it is characterized by to update the amount of amendments on

every N frame (N>=1), and updating the amount of amendments, when an input dynamic image is investigated for every frame and a cutting point is detected.

[0068] In the 1st to 5th above-mentioned image art, in case the 6th image art of this invention acquires the amount of amendments from an input dynamic image, it is characterized by performing high definition-ized amendment of n kinds (n>=1) of arbitration to an input dynamic image acquiring the amount of amendments of n kinds (n>=1) of arbitration, and based on the calculated amount of amendments.

[0069] The 7th image art of this invention is characterized by performing white balance amendment to a frame image in the 2nd to 5th above-mentioned image art acquiring the amount of white balance amendments, in case the amount of amendments is acquired from a frame image, and based on the calculated amount of amendments.

[0070] The 8th image art of this invention is characterized by performing contrast amendment to a frame image in the 5th [the above 2nd to], and 7th image art acquiring the amount of contrast amendments, in case the amount of amendments is acquired from a frame image, and based on the calculated amount of amendments.

[0071] The 9th image art of this invention is characterized by performing saturation amendment to a frame image in the 5th [the above 2nd to], 7th, and 8th image art acquiring the amount of saturation amendments, in case the amount of amendments is acquired from a frame image, and based on the calculated amount of amendments.

[0072] The 10th image art of this invention is characterized by performing exposure amendment to a frame image in the 5th [the above 2nd to], and the 7th to 9th image art acquiring the amount of exposure amendments, in case the amount of amendments is acquired from a frame image, and based on the calculated amount of amendments.

[0073] The 11th image art of this invention is characterized by performing sharpness amendment to a frame image in the 5th [the above 2nd to], and the 7th to 10th image art acquiring the amount of sharpness amendments, in case the amount of amendments is acquired from a frame image, and based on the calculated amount of amendments.

[0074] The 12th image art of this invention is characterized by to acquire the desirable amount of color correction which shows the amount of amendments to a desirable color beforehand set up in a dynamic image, in case the amount of amendments is acquired from a frame image, and performing color correction desirable in a frame image based on the calculated amount of amendments in the 5th [the above 2nd to], and the 7th to 11th image art.

[0075] Before the 13th image art of this invention has memorized the amount of amendments of the present frame acquired in the 7th to 12th above-mentioned image art, it is characterized by restricting variation with the amount of amendments of a frame.

[0076] In the 7th to 13th above-mentioned image art, the 14th image art of this invention starts an assessment image field required in order to acquire the amount of amendments from a frame image, and is characterized by acquiring the amount of amendments from the cut-down assessment image.

[0077] In the above 4th and the 5th image art, in case the 15th image art of this invention detects a cutting point which shows instead of [OFF / of a screen in a dynamic image], it makes characteristic quantity a result of having compared a color histogram created based on color information on each pixel of a frame image for every frame, and it is characterized by detecting a cutting point of a dynamic image based on change of this characteristic quantity.

[0078] In the 15th above-mentioned image art, when detecting a cutting point, the 16th image art of this invention is characterized by creating a color histogram, after it thins out an image at a fixed gap, in case it creates a color histogram from a frame image.

[0079] The 17th image art of this invention is set to the 1st to 16th above-mentioned image art. When a dynamic image is flowing to a part in a screen like a screen of a personal computer, before performing amendment processing to an input image, an amendment object domain is started from an input image, and perform image amendment to the cut-down image for amendment, It is characterized by making a non-amending object domain which is the remaining portion when starting an amendment object domain and an amendment object domain to which image amendment was performed rival, and outputting an image.

[0080] Processing which acquires the one or more amounts of amendments from an input dynamic image in order that it may high-definition--ization-amend an input dynamic image, in case the 1st program of this invention high-definition-izes an image by which a sequential input is carried out, It is characterized by making a computer perform processing which controls change of the amount of amendments as compared with the amount of amendments which was able to obtain the acquired amount of amendments from one or more frames in front of the one or more past, and processing which performs high definition-ized amendment to a frame image based on the controlled amount of amendments.

[0081] Processing which acquires the one or more amounts of amendments from an input dynamic image in order that it may high-definition--ization-amend an input dynamic image, in case the 2nd program of this invention high-definition-izes an image by which a sequential input is carried out, Processing which detects a cutting point of a dynamic image based on change of characteristic quantity for which it asked from a frame image of an inputted dynamic image,

Processing which controls variation of the amount of amendments in consideration of existence of a cutting point [the amount of amendments which was able to obtain the acquired amount of amendments from one or more frames in front of the one or more past], It is characterized by making a computer perform processing which performs high definition-ized amendment to a frame image based on the controlled amount of amendments.

[0082] As mentioned above, in case this invention determines the amount of amendments of the newest frame, it is calculating variation of the amount of amendments of the newest frame, and the amount of amendments of a past frame, and holding this down to variation which is the degree which a flicker etc. does not produce, and it becomes possible to high-definition-ize a dynamic image automatically, without presenting vanity with sense of incongruity, such as a flicker.

[0083] By using cut inspection appearance, this invention enables it to high-definition-ize that a scene changed in the suitable amount of amendments according to a difference in a scene, since it becomes possible to detect.

[0084] If a scene in a dynamic image changes, an image with which vanity differs from the image till then will be inputted into a system. Thus, when vanity of an image changes a lot, the optimal amount of amendments for each image may also change a lot. By conventional method, since this amount of amendments was made into a fixed parameter, it has not amended to a dynamic image in the suitable amount of amendments.

[0085] In this invention, if a change of a scene is detected, since it will become possible to acquire the optimal amount of amendments automatically with the amount acquisition means of animation amendments anew there, a difference in a scene is detected and it becomes possible to perform high definition-ized amendment in the optimal amount of amendments for each.

[0086] Since appraisal universe can be started in magnitude of arbitration with an appraisal universe logging means in case cut inspection appearance and the amount acquisition means of amendments in a frame evaluate an image by this invention, it becomes possible not to be based on a difference in the image source, but to high-definition-ize automatically.

[0087] As for a dynamic image, a viewing area changes greatly with the input sources. An image is expressed as TV image or a game image throughout TV monitor. To it, a band with up and down black a Hi-Vision image, a film, etc. is displayed, and a viewing area of an image is small.

[0088] By high definition-ized amendment method mentioned as an example in this invention, a case where this black band influences and the more nearly optimal amount of amendments cannot be obtained comes out. For example, although contrast amendment determines the amount of amendments based on a dark field of a screen, if the whole screen is made into appraisal universe, it cannot determine the amount of amendments based on a field of an up-and-down black band, and cannot high-definition-ize an image of fields other than a black obi the optimal.

[0089] A case where similarly this black **** influences and cut inspection appearance mentioned as an example in this invention cannot detect a cutting point appropriately, either comes out. However, by using an appraisal universe logging means expressed here, these problems are solved and it becomes possible to carve a scene appropriately and to high-definition-ize a dynamic image in the optimal amount of amendments.

[0090] Since a saturation amendment means which is the still picture automatic high definition-ized technique, an exposure amendment means, a white balance amendment means, a contrast amendment means, a sharpness amendment means, and a desirable color correction means are included in a configuration of an image processor in independently various respectively combination by this invention, it becomes possible to perform various high definition-ized amendments automatically.

[0091] Moreover, in this invention, not only six means that were mentioned above but other high definition-ized means are incorporated, and it becomes possible like the six above-mentioned amendment means to high-definition-ize a dynamic image.

[0092] In this invention, in cut inspection appearance mentioned above, since it thins out in case the cut inspection appearance is performed, and an image is created, it is not based on the property of an interlace but it becomes possible to perform cut inspection appearance.

[0093] In this invention, an image with various TV images, DVD images, etc. is assumed in an input image. Two images may sometimes lap and be visible to these images in one frame. To video signals which are interlace images being 30 frames per second, this is the phenomenon generated when dynamic images of the base are 24 frames per second, and a phenomenon in which two images lap and appear in the one above frame by the difference in the frame rate has generated it.

[0094] Thus, when two images lap, at a cutting point, an image of a front scene and an image of the following scene lap and are visible to one frame. When it becomes like this, similarity of a frame before and behind that becomes high, and cut inspection appearance stated by the above-mentioned effect may stop succeeding in a cutting point. Therefore, by

thinning out an image, a lap of an image is abolished and it becomes possible for cut inspection appearance to be able to be made to improve more.
[0095] Since there is an image composition means return the dynamic image which became possible [starting a dynamic-image field in an input image], started further, and performed high-definition-ized amendment with an amendment field logging means to arrangement like the original computer screen in case high-definition-ized amendment processing performs in this invention, it becomes possible to high-definition-ize only the dynamic-image field, and to display it to the image with which a dynamic image is flowing like a computer screen in some screens.
[0096] Although the perimeter is a still picture on a computer screen when application which displays dynamic images, such as a media player, is started, an image with which a dynamic image is flowing locally is made. On the other hand, an amendment field logging means carves a field of a still picture, and a field of a dynamic image. Consequently, it becomes possible to carry out high definition-ized amendment using the optimal amount of amendments for a field of a dynamic image.
[0097] Thus, an amended dynamic image is compounded with a surrounding still picture field by image composition means, and although it is a display like the original computer screen, what is high-definition-ized in the amount of amendments for a dynamic image with optimal dynamic image is obtained.
[0098]
[Embodiment of the Invention] Next, the example of this invention is explained with reference to a drawing. Drawing 1 is the block diagram showing the configuration of the image processor by the 1st example of this invention. In drawing 1 , the image processor by the 1st example of this invention A DVD (Digital Versatile Disc) player and a computer, An image input means 1 to acquire the frame image which connects with a game device, DV (Digital Video) camera, etc., and constitutes an input dynamic image, It consists of a data processor 2 which operates by program control, storage 3 which memorizes information, and an image output means 4 to output the frame image after amendment outside.
[0099] Storage 3 is equipped with the amount storage section 31 of amendments. The amount storage section 31 of amendments memorizes the amount of the newest amendments. Although there are various things, such as the amount of exposure amendments, the amount of white balance amendments, the amount of contrast amendments, the amount of saturation amendments, and the amount of sharpness amendments, as an amount of amendments currently recorded, what is recorded changes not only with what was mentioned here but with amendment processings performed actually.
[0100] The data processor 2 is equipped with the amount acquisition means 21 of amendments, the amount record means 22 of amendments, and the image amendment means 23. The amount acquisition means 21 of amendments computes the amount of amendments from the frame image acquired from the image input means 1. The amount record means 22 of amendments memorizes the amount of amendments calculated with the amount acquisition means 21 of amendments in the amount storage section 31 of amendments.
[0101] The image amendment means 23 applies high definition-ized amendment to the frame image acquired from the image input means 1 using the amount of amendments memorized by the amount storage section 31 of amendments, and outputs the image after amendment to the image output means 4.
[0102] Drawing 2 is the block diagram showing the detailed configuration of the amount acquisition means 21 of amendments of drawing 1 . In drawing 2 , the amount acquisition means 21 of amendments consists of the appraisal universe logging means 211, the amount calculation means 212 of amendments, a upper-limit adjustment means 213, the upper-limit storage section 214, and the set point storage section 215.
[0103] The appraisal universe logging means 211 starts the assessment image field used from a frame image in the case of the amount calculation of amendments. The upper-limit storage section 214 has memorized the maximum which each amount of amendments can take. The set point storage section 215 has memorized the default of each amount of amendments.
[0104] The amount calculation means 212 of amendments consists of as desirable amount calculation means 2126 of color correction as the amount calculation means 2121 of saturation amendments, the amount calculation means 2122 of white balance amendments, the amount calculation means 2123 of contrast amendments, the amount calculation means 2124 of exposure amendments, and the amount calculation means 2125 of sharpness amendments. Here, the one or more means in each amount calculation means of amendments of any amount calculation means 212 of amendments may be missing. Moreover, the amount calculation means of amendments mentioned here is an example, and may incorporate other amount calculation means of amendments. Moreover, although each amount calculation means of amendments is illustrated to juxtaposition in drawing 2 , you may perform serially in order of arbitration.
[0105] The amount calculation means 2121 of saturation amendments extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the amount of saturation amendments based on the characteristic quantity. The amount calculation means 2122 of white balance amendments

extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the amount of white balance amendments based on the characteristic quantity.
[0106] The amount calculation means 2123 of contrast amendments extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the amount of contrast amendments based on the characteristic quantity. The amount calculation means 2124 of exposure amendments extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the amount of exposure amendments based on the characteristic quantity.
[0107] The amount calculation means 2125 of sharpness amendments extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the amount of sharpness amendments based on the characteristic quantity. The desirable amount calculation means 2126 of color correction extracts characteristic quantity from the image for assessment cut down with the appraisal universe logging means 211, and determines the desirable amount of color correction for performing amendment to the desirable color beforehand set up based on the characteristic quantity.
[0108] Desirable color correction is here for realizing the color which looks at only the amended image and is sensed that human being is desirable, and the pile of old know how is accumulated in the data base, and it is carried out based on the content accumulated in the data base. That is, the color correction parameter given in advance according to each division hue field is applied, and flesh color, azure, and the hue that is related green [vegetation] are amended to the hue used as a more desirable color. Consequently, only flesh color, azure, and the green color of vegetation change, and it becomes a more desirable color. This desirable color correction is indicated by the above-mentioned reference 4.
[0109] The upper-limit adjustment means 213 is changed into the set point currently recorded in the set point storage section 215 when either of the amounts of amendments gained by the amount calculation means 212 of amendments exceeds the upper limit currently recorded in the upper-limit storage section 214.
[0110] Drawing 3 is drawing for explaining the preparation of the amount of amendments which used the upper limit and the set point of the amount acquisition means 21 of amendments of drawing 1 . In drawing 3 , the upper-limit adjustment means 213 is changed into the set point currently recorded in the set point storage section 215, when either of the amounts of amendments gained by the amount calculation means 212 of amendments exceeds the upper limit currently recorded in the upper-limit storage section 214.
[0111] Drawing 4 is the block diagram showing the detailed example of a configuration of the image amendment means 23 of drawing 1 . In drawing 4 , the image amendment means 23 consists of as desirable color correction means 236 as the white balance amendment means 231, the contrast amendment means 232, the exposure amendment means 233, the saturation amendment means 234, and the sharpness amendment means 235. The location sequence of these amendment means is not restricted to drawing 4 in order of a publication. Moreover, any one or more means amendment means may be missing among each amendment means, and other amendment means may be added.
[0112] The white balance amendment means 231 performs white balance amendment to the inputted frame image based on the amount of white balance amendments in the amount of amendments currently recorded in the amount storage section 31 of amendments. The contrast amendment means 232 performs contrast amendment to the inputted frame image based on the amount of contrast amendments in the amount of amendments currently recorded in the amount storage section 31 of amendments.
[0113] The exposure amendment means 233 performs exposure amendment to the inputted frame image based on the amount of exposure amendments in the amount of amendments currently recorded in the amount storage section 31 of amendments. The saturation amendment means 234 performs saturation amendment to the inputted frame image based on the amount of saturation amendments in the amount of amendments currently recorded in the amount storage section 31 of amendments.
[0114] The sharpness amendment means 235 performs sharpness amendment to the inputted frame image based on the amount of sharpness amendments in the amount of amendments currently recorded in the amount storage section 31 of amendments. The desirable color correction means 236 performs desirable color correction to the inputted frame image based on the desirable amount of color correction in the amount of amendments currently recorded in the amount storage section 31 of amendments.
[0115] Drawing 5 is a flow chart which shows actuation of the image processor by the 1st example of this invention, and drawing 6 and drawing 7 are flow charts which show actuation of the amount acquisition means 21 of amendments of drawing 1 . With reference to these drawing 1 - drawing 7 , actuation of the image processor by the 1st example of this invention is explained.
[0116] An image processor will initialize a storage region, a variable, etc. first, if processing is started (drawing 5 step S1). Then, an image processor acquires the image for amendment (drawing 5 step S2), computes the amount of image

amendments based on the acquired image (drawing 5 step S3), and memorizes the computed amount of image amendments (drawing 5 step S4).
[0117] An image processor performs image amendment processing to an input image based on the computed amendment (drawing 5 step S5), and outputs the image which amended (drawing 5 step S6). Then, if the image processor is judged and (drawing 5 step S7) inputted [whether the image is inputted and or not], it will return to step S2, will acquire an image, and will repeat the same processing as the above. An image processor ends processing, if the image is not inputted.
[0118] If processing is started in the amount acquisition means 21 of amendments, the appraisal universe for acquiring the amount of amendments from a frame image first will be started (drawing 6 step S11). The amount of saturation amendments is computed to this cut-down image for assessment (drawing 6 step S12).
[0119] Following this, the amount acquisition means 21 of amendments computes the amount of sequential exposure amendments (drawing 6 step S13), computes the amount of white balance amendments (drawing 6 step S14), computes the amount of contrast amendments (drawing 6 step S15), computes the amount of sharpness amendments (drawing 6 step S16), and computes the desirable amount of color correction (drawing 6 step S17). In addition, the order of acquisition of each amount of amendments is not restricted to this. Moreover, it may be [of / any / one or more / the above amounts of amendments] missing, and other amounts of amendments may be computed.
[0120] Next, the amount acquisition means 21 of amendments checks the upper limit of the acquired amount of amendments. First, the amount acquisition means 21 of amendments investigates whether the amount of saturation amendments is over the upper limit (drawing 6 step S18), makes the set point the amount of saturation amendments acquired when it was over the upper limit (drawing 6 step S19), and if it is not over the upper limit, it considers it as as [the amount of saturation amendments acquired previously].
[0121] Similarly, the amount acquisition means 21 of amendments investigates whether the amount of exposure amendments is over the upper limit (drawing 6 step S20), makes the set point the amount of exposure amendments acquired when it was over the upper limit (drawing 6 step S21), and if it is not over the upper limit, it considers it as as [the amount of exposure amendments acquired previously].
[0122] The amount acquisition means 21 of amendments investigates whether the amount of white balance amendments is over the upper limit (drawing 7 step S22), makes the set point the amount of white balance amendments acquired when it was over the upper limit (drawing 7 step S23), and if it is not over the upper limit, it considers it as as [the amount of white balance amendments acquired previously].
[0123] The amount acquisition means 21 of amendments investigates whether the amount of contrast amendments is over the upper limit (drawing 7 step S24), makes the set point the amount of contrast amendments acquired when it was over the upper limit (drawing 7 step S25), and if it is not over the upper limit, it considers it as as [the amount of contrast amendments acquired previously].
[0124] The amount acquisition means 21 of amendments investigates whether the amount of sharpness amendments is over the upper limit (drawing 7 step S26), makes the set point the amount of sharpness amendments acquired when it was over the upper limit (drawing 7 step S27), and if it is not over the upper limit, it considers it as as [the amount of sharpness amendments acquired previously].
[0125] Finally, the amount acquisition means 21 of amendments investigates whether the desirable amount of color correction is over the upper limit (drawing 7 step S28), makes the set point the desirable amount of color correction acquired when it was over the upper limit (drawing 7 step S29), and if it is not over the upper limit, it considers it as as [the desirable amount of color correction acquired previously]. The amount acquisition means 21 of amendments ends processing, after processing the above process.
[0126] Thus, a dynamic image can be high-definition-ized automatically, without presenting the vanity which has sense of incongruity, such as a flicker, by calculating the variation of the amount of amendments of the newest frame, and the amount of amendments of a past frame, and holding this down to the variation which is the degree which a flicker etc. does not produce, in case the amount of amendments of the newest frame is determined.
[0127] Moreover, in this example, since appraisal universe can be started in the magnitude of arbitration in the appraisal universe logging means 211 in case the amount acquisition means 21 of amendments evaluates an image, it cannot be based on the difference in the image source, but can high-definition-ize automatically.
[0128] Furthermore, in this example, since the saturation amendment means 234 which is the still picture automatic high definition-ized technique, the exposure amendment means 233, the white balance amendment means 231, the contrast amendment means 232, the sharpness amendment means 235, and the desirable color correction means 236 can be included in the configuration of an image processor in independently various respectively combination, various high definition-ized amendments can be performed automatically. Moreover, not only six means raised here but other high

definition-ized means can be incorporated, and a dynamic image can be high-definition-ized like the six above-mentioned amendment means.

[0129] Drawing 8 is the block diagram showing the configuration of the image processor by the 2nd example of this invention. In drawing 8 , except having formed the amount change limit means 24 of amendments in the data processor 5, the image processor by the 2nd example of this invention has the same composition as the 1st example of this invention shown at drawing 1 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as that of the 1st example of this invention.

[0130] The amount change control means 24 of amendments changes the amount of amendments so that variation may not exceed constant value for the amount of amendments acquired with the amount acquisition means 21 of amendments according to the comparison result as compared with the amount of amendments of a before frame.

[0131] Drawing 9 is the block diagram showing the detailed configuration of the amount change limit means 24 of amendments of drawing 8 . In drawing 9 , the amount change limit means 24 of amendments consists of a variation calculation means 241, a variation limit means 242, and the maximum change width-of-face storage section 243.

[0132] The maximum change width-of-face storage section 243 has memorized the maximum variation which can change when changing from the amount of amendments of a before frame to the amount of amendments of the present frame in the continuing frame image.

[0133] Before the variation calculation means 241 is recorded the amount of amendments of the newest frame obtained from the amount acquisition means 21 of amendments, and in the amount storage section 31 of amendments, it calculates the absolute value of the difference from the amount of amendments of a frame, and calculates the variation of the amount of amendments.

[0134] The variation limit means 242 restricts the amount of amendments of the present frame so that the maximum change width of face by which the variation of the amount of amendments computed with the variation calculation means 241 is recorded in the maximum change width-of-face storage section 243 may not be exceeded.

[0135] Drawing 10 is drawing showing an example of processing of the variation change limit means 24 of drawing 8 . As shown in drawing 10 , the variation change limit means 24 outputs the amount of amendments of the present frame as it is, if the absolute value of the difference of the amount of new amendments and the amount of old amendments is calculated and the value is not over the maximum change width of face.

[0136] By making the variation the same as the maximum change width of face, if the absolute value of a difference is over the maximum change width of face, the variation change limit means 24 will restrict the amount of amendments of the present frame, and will output the amount of amendments after a limit so that the absolute value of a difference may be settled within change width of face.

[0137] Drawing 11 is a flow chart which shows actuation of the image processor by the 2nd example of this invention. With reference to these drawing 8 - drawing 11 , actuation of the image processor by the 2nd example of this invention is explained. In addition, in drawing 11 , since steps S31-S33 and processing actuation of S35-38 are the same as processing actuation of steps S1-S7 shown in drawing 5 , the explanation is omitted.

[0138] In the 1st example of this invention, if the amount of amendments is acquired from an input image, the amount of amendments was recorded as it was, and image amendment has been performed to the input image. On the other hand, in this example, after acquiring the amount of amendments (drawing 11 step S33), variation with the amount of amendments of the before frame when using the amount of amendments for image amendment as it was is restricted within a certain constant value (drawing 11 step S34).

[0139] As mentioned above, in this example, what restricted the time variation of the amount of amendments is recorded (drawing 11 step S35), and image amendment is performed to the input image based on it (drawing 11 step S36).

[0140] Thus, at this example, phenomena which look unnatural, such as a flicker, are solved by holding down the time variation of the amount of amendments to the range which does not sense a flicker. That is, with the amount change limit means 24 of amendments, the amount of amendments was changed within limits which do not sense a flicker, and automatic high definition-ization of a dynamic image is realized.

[0141] By the conventional method, since the image quality of each frame image differs a little, respectively when the still picture high definition-ized technique is applied to each frame image of a dynamic image, the amount of amendments changes for every frame. If the amount of amendments changes a lot in the frame image which adjoins in time, since the vanity of an image will change momentarily, it comes to sense a flicker for the dynamic image after amendment. This trouble is solved in this example.

[0142] Drawing 12 is the block diagram showing the configuration of the image processor by the 3rd example of this invention. In drawing 12 , except having formed the renewal decision means 25 of the amount of amendments, and the

variation limit activation decision means 26 in the data processor 6, and having formed the frame number storage section 32 in storage 7, the image processor by the 3rd example of this invention has the same composition as the 2nd example of this invention shown in drawing 8 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as that of the 2nd example of this invention.

[0143] Detection of that 1 **** of the values of the frame number storage section 32 would be carried out, and the cutting point would be detected from the obtained frame image, or the value of the frame number storage section 32 will be over constant value if the renewal decision means 25 of the amount of amendments acquires an image from the image input means 1 determines to update the amount of amendments. That is, the renewal decision means 25 of the amount of amendments will send a cut inspection appearance signal, if a cutting point is detected, and if it detects that fixed time amount passed, a fixed time amount progress signal will be sent.

[0144] It is determined whether, with the signal received from the renewal decision means 25 of the amount of amendments, the variation limit activation decision means 26 performs the amount change limit means 24 of amendments. That is, a variation limit activation decision means 26 will send the amount of amendments to the amount record means 22 of amendments, if a cut inspection appearance signal is received from delivery and the renewal decision means 25 of the amount of amendments to the amount change limit means 24 of amendments in the amount of amendments obtained from the amount acquisition means 21 of amendments when a fixed time-amount progress signal was received from the renewal decision means 25 of the amount of amendments.

[0145] Drawing 13 is the block diagram showing the detailed configuration of the renewal decision means 25 of the amount of amendments of drawing 12 . In drawing 13 , the renewal decision means 25 of the amount of amendments consists of a frame count means 251, a cut inspection appearance means 252, and a fixed time amount progress detection means 253.

[0146] The frame count means 251 will carry out 1 **** of the frame numbers memorized by the frame number storage section 32, if a frame changes in an input image. The cut inspection appearance means 252 detects a cutting point by comparing with the characteristic quantity which extracted characteristic quantity from the input image and extracted this characteristic quantity with the before frame. If a cutting point is detected, the frame count means 251 will output a cut inspection appearance signal, and will reset the frame number storage section 32.

[0147] It detects whether a fixed time amount progress detection means 253 investigated the frame number memorized by the frame number storage section 32, and is over a certain constant value. If it detects having gone through fixed time amount, a fixed time amount progress detection means 253 will output a fixed time amount progress signal, and will reset the frame number storage section 32.

[0148] Drawing 14 is the block diagram showing the detailed configuration of the cut inspection appearance means 252 of drawing 13 . In drawing 14 , the cut inspection appearance means 252 consists of the appraisal universe logging means 2521, the image infanticide means 2522, a histogram creation means 2523, a histogram comparison means 2524, and the histogram storage section 2525.

[0149] the difference in the example of a comparison of the focus which drawing 15 is drawing for explaining the color histogram used with the cut inspection appearance means 252 of drawing 13 , and uses drawing 16 with the cut inspection appearance means 252 of drawing 13 -- it is drawing showing the relation between transition of a value and a threshold. With reference to these drawing 14 - drawing 16 , actuation of the cut inspection appearance means 252 is explained.

[0150] The appraisal universe logging means 2521 starts the image field used for cut inspection appearance from the inputted frame image. The image infanticide means 2522 is extracted from the image cut down by the appraisal universe logging means 2521 to every n pixel (n>=1), thins out the extracted pixel collectively, and creates an image.

[0151] The histogram creation means 2523 creates a color histogram based on the color information on each pixel of the inputted frame image. A color histogram is a histogram independently created to the RGB value which is the color information on each pixel of a frame image, respectively, as shown in drawing 15 .

[0152] The histogram storage section 2525 has memorized the histogram extracted from the before frame. It judges whether the histogram comparison means 2524 compares the color histogram of a frame, before being memorized by the color histogram and the histogram storage section 2525 which were created by the histogram creation means 2523, and a cutting point is in inter-frame [the] from the obtained characteristic quantity.

[0153] comparison processing of a histogram currently performed with the histogram comparison means 2524 here -- the difference of a histogram -- although there are technique using a value, technique using a correlation value, etc., it does not limit especially about the technique. here -- the difference of a histogram -- the case where a value is used is explained.

[0154] the difference of a histogram -- if a frame changes as it is shown in drawing 16 , when a value is used -- the

difference -- a value changes. inter-frame [which is a cutting point] -- the difference -- it is in the inclination for a value to become larger than others. for this reason, the difference larger as shown in drawing 16 by preparing a threshold than this threshold -- when it becomes a value, it can classify with a cutting point, when small, it can classify with the point cutting [un-], and cut inspection appearance can be performed. In addition, the technique of the above-mentioned cut inspection appearance is applicable not only to image processing like this example but compression of an image, the epitome creation from an image, etc.

[0155] Drawing 17 is a flow chart which shows actuation of the image processor by the 3rd example of this invention. With reference to these drawing 12 , drawing 13 , and drawing 17 , actuation of the image processor by the 3rd example of this invention is explained. In addition, since processing actuation of steps S41, S42, S46, S48, S49, S50-S52 of drawing 17 is the same as processing actuation of drawing 11 of step S31-38, the explanation is omitted.

[0156] In the 2nd example of this invention, if the amount of amendments is acquired from an input image, the range which the variation of the amount of amendments and the amount of amendments obtained from the before frame can take will be restricted. On the other hand, in this example, whenever a new frame image is inputted first, 1 is added to the frame count means 251 (drawing 17 step S43).

[0157] In this example, if a cutting point is detected in the inputted image or the frame count means 251 exceeds constant value, it will judge with updating the amount of amendments (drawing 17 step S44). When the amount of amendments is not updated, the present amount of amendments performs image amendment (drawing 17 step S50).

[0158] When the amount of amendments is updated, the frame count means 251 is reset to 0 (drawing 17 step S45), and the amount of amendments is acquired from the present frame image (drawing 17 step S46). At this time, when the cutting point is detected, this amount of amendments is recorded (the drawing 17 step S47) and here (drawing 17 step S49), and image amendment is carried out. The amount of amendments to which the variation of (the drawing 17 step S47) and the amount of amendments was restricted when the cutting point was not detected (drawing 17 step S48), and variation was restricted is recorded (drawing 17 step S49), and image amendment is carried out.

[0159] Drawing 18 is a flow chart which shows actuation of the renewal decision means 25 of the amount of amendments of drawing 12 . With reference to these drawing 12 , drawing 13 , and drawing 18 , actuation of the renewal decision means 25 of the amount of amendments is explained.

[0160] If processing is started, the renewal decision means 25 of the amount of amendments will increase the frame count means 251 one (drawing 18 step S61), and will investigate the existence of a cutting point based on a frame image (drawing 18 step S62).

[0161] The renewal decision means 25 of the amount of amendments investigates whether the cutting point was detected (drawing 18 step S63), if it is detected, it will output a cut inspection appearance signal (drawing 18 step S64), it sets the frame count means 251 to 0 (drawing 18 step S67), and shifts processing to the amount acquisition means 21 of amendments.

[0162] If a cutting point is not detected, the renewal decision means 25 of the amount of amendments investigates whether the frame count means 251 is over constant value (drawing 18 step S65), if it is over constant value, it will output a fixed time amount detecting signal (drawing 18 step S66), it sets the frame count means 251 to 0 (drawing 18 step S67), and shifts processing to the amount acquisition means 21 of amendments. If it judges with the renewal decision means 25 of the amount of amendments being over constant value, processing will be shifted to the image amendment means 23 as it is.

[0163] Drawing 19 is a flow chart which shows actuation of the cut inspection appearance means 252 of drawing 13 . With reference to these drawing 13 , drawing 14 , and drawing 19 , actuation of the cut inspection appearance means 252 is explained.

[0164] The cut inspection appearance means 252 will create the infanticide image which started the image field used for cut inspection appearance from a frame image (drawing 19 step S71), and extracted and summarized it from the cut-down image to every n pixel (n>=0), if processing is started (drawing 19 step S72).

[0165] The cut inspection appearance means 252 creates a histogram based on this infanticide image (drawing 19 step S73), and compares this histogram with the histogram of a before frame (drawing 19 step S74).

[0166] As a result of that comparison, the cut inspection appearance means 252 investigates whether the cutting point was detected (drawing 19 step S75), if a cutting point is detected, it will output a cut inspection appearance signal (drawing 19 step S76), it records the histogram created by this processing (drawing 19 step S77), and ends processing.

[0167] In this example, since it is detectable that the scene changed by using cut inspection appearance, it can be high-definition-ized in the suitable amount of amendments according to the difference in a scene.

[0168] If the scene in a dynamic image changes, the image with which vanity differs from the image till then will be inputted into a system. Thus, when the vanity of an image changes a lot, the optimal amount of amendments for each

image may also change a lot.
[0169] By the conventional method, since this amount of amendments is made into the fixed parameter, it cannot amend to a dynamic image in the suitable amount of amendments. On the other hand, if the change of a scene is detected, the optimal amount of amendments is automatically acquirable in this invention, anew with the amount acquisition means 21 of amendments there. For this reason, the difference in a scene can be detected and high definition-ized amendment can be performed in the optimal amount of amendments for each.
[0170] As for a dynamic image, a viewing area changes greatly with the input sources. An image is expressed as TV image or a game image throughout TV monitor. To it, on the Hi-Vision image or the film, a black band is displayed up and down and the viewing area of an image is small.
[0171] In this example, the case where this black band influences and the more nearly optimal amount of amendments cannot be obtained comes out. For example, although contrast amendment determines the amount of amendments based on the dark field of a screen, if the whole screen is made into appraisal universe, it cannot determine the amount of amendments based on the field of an up-and-down black band, and cannot high-definition-ize the image of fields other than a black obi the optimal.
[0172] The case where similarly this black **** influences and cut inspection appearance cannot detect a cutting point appropriately, either comes out. However, by using the appraisal universe logging means 211 expressed here, these problems can be solved, a scene can be carved appropriately and a dynamic image can be high-definition-ized in the optimal amount of amendments.
[0173] In this example, since it thins out in case cut inspection appearance is performed, and the image is created, it cannot be based on the property of an interlace but a cutting point can be detected. In this example, the image with various TV images, DVD images, etc. is assumed in the input image. Two images may sometimes lap and be visible to these images in one frame. To the video signals which are interlace images being 30 frames per second, this is the phenomenon generated when the dynamic images of the base are 24 frames per second, and the phenomenon in which two images lap and appear in one frame by the difference in the frame rate has generated it.
[0174] As mentioned above, when two images lap, at a cutting point, the image of a front scene and the image of the following scene lap and are visible to one frame. When it becomes like this, the similarity of the frame before and behind that becomes high, and detection of the cutting point mentioned above may stop succeeding in a cutting point. Therefore, by thinning out an image, the lap of an image can be abolished and a cutting point can be detected better.
[0175] Drawing 20 is the block diagram showing the configuration of the image processor by the 4th example of this invention. In drawing 20 , except having formed the amendment field logging means 27 and the image composition means 28 in the data processor 8, the image processor by the 4th example of this invention has the same composition as the 1st example of this invention shown at drawing 1 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as that of the 1st example of this invention.
[0176] Drawing 21 is the mimetic diagram showing processing of the image processor by the 4th example of this invention. With reference to this drawing 21 , the above-mentioned amendment field logging means 27 and the above-mentioned image composition means 28 are explained.
[0177] As shown in drawing 21 (a), the amendment field logging means 27 starts an amendment object domain from the image with which the animation is flowing selectively, and carves a logging image as shown in drawing 21 (b), and a non-amending object domain image as shown in drawing 21 (e). A logging image as shown in drawing 21 (b) is high-definition-ized by the high definition-ized technique in which it explained in the 1st example of this invention as shown in drawing 21 (c).
[0178] The image composition means 28 compounds the non-amending object domain image cut down with the amendment field logging means 27, and the image after amendment, and creates an input image as shown in drawing 21 (d). Here, the created image is outputted from the image output means 4, and processing is completed.
[0179] Drawing 22 is a flow chart which shows actuation of the image processor by the 4th example of this invention. With reference to these drawing 20 - drawing 22 , actuation of the image processor by the 4th example of this invention is explained. In addition, since steps S81, S82, S84-S86 of drawing 22 and processing actuation of S88 and S89 are the same as processing actuation of steps S1-S7 of drawing 5 , the explanation is omitted.
[0180] In the 1st example of this invention, it has amended by making the whole input image into an amendment object domain. On the other hand, in this example, the field where the dynamic image is first displayed from the input image is started (drawing 22 step S83).
[0181] In this example, the amount of amendments is acquired to this cut-down image (drawing 22 step S84), it starts based on that amount of amendments, and amendment processing is performed only to an image (drawing 22 step S86). The image after amendment is compounded with the non-amending object domain which are the remaining images

which started the amendment object domain (drawing 22 step S87), and serves as the original image and same screen. In this example, this processing is repeated until an input image is lost.

[0182] Since there is an image composition means 28 return the dynamic image which could start the dynamic-image field in an input image, started further, and performed high-definition-ized amendment with the amendment field logging means 27 to arrangement like the original computer screen in case high-definition-ized amendment processing is performed, only the dynamic-image field can high-definition-ize, and can display like a computer screen in this invention to the image with which the dynamic image is flowing in some screens.

[0183] Although the perimeter is a still picture on a computer screen when the application which displays dynamic images, such as a media player, is started, the image with which the dynamic image is flowing locally is made. On the other hand, the amendment field logging means 27 carves the field of a still picture, and the field of a dynamic image. Consequently, high definition-ized amendment can be performed using the optimal amount of amendments for the field of a dynamic image. Thus, the amended dynamic image is compounded with a surrounding still picture field by the image composition means 28, and although it is a display like the original computer screen, what is high-definition-ized in the amount of amendments for a dynamic image with the optimal dynamic image is obtained.

[0184] Drawing 23 is the block diagram showing the configuration of the image processor by the 5th example of this invention. In drawing 23 , except having constituted so that the image amended with the image amendment means 30 in the data processor 9 might be returned to the amount acquisition means 29 of amendments, the image processor by the 5th example of this invention has the same composition as the 1st example of this invention shown in drawing 1 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as that of the 1st example of this invention.

[0185] Drawing 24 is the block diagram showing the detailed configuration of the amount acquisition means 29 of amendments of drawing 23 . In drawing 24 , except having inputted into the appraisal universe logging means 211 the image amended with the image amendment means 30, the amount acquisition means 29 of amendments has the same composition as the amount acquisition means 21 of amendments shown in drawing 2 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as actuation of the amount acquisition means 21 of amendments.

[0186] Drawing 25 is the block diagram showing the detailed example of a configuration of the image amendment means 30 of drawing 23 . In drawing 25 , except having formed the amendment image buffer 237, the image amendment means 30 has the same composition as the image amendment means 23 shown in drawing 4 , and has given the same sign to the same component. Moreover, actuation of the same component is the same as actuation of the image amendment means 23.

[0187] With reference to these drawing 23 - drawing 25 , characteristic actuation of the image processor by the 5th example of this invention is explained. It amends with each amendment means of an image amendment means 30 based on the amount of amendments acquired with each calculation means of the amount acquisition means 29 of amendments, and the amount of amendments is making each calculation means of the amount acquisition means 29 of amendments acquire from the amended image by constituting from an image processor by the 5th example of this invention so that the image amended with an image amendment means 30 may return to the amount acquisition means 29 of amendments.

[0188] That is, first, the saturation amendment means 234 returns the amendment image to the amount acquisition means 29 of amendments while it amends to an input image based on the amount of amendments acquired with the amount calculation means 2121 of saturation amendments and accumulates the amendment image in the amendment image buffer 237 temporarily.

[0189] Then, the amount calculation means 2122 of white balance amendments acquires the amount of amendments from the amendment image in the saturation amendment means 234. The white balance amendment means 231 returns the amendment image to the amount acquisition means 29 of amendments while it amends to the amendment image in the saturation amendment means 234 accumulated in the amendment image buffer 237 temporarily based on the amount of amendments acquired with the amount calculation means 2122 of white balance amendments and accumulates the amendment image in the amendment image buffer 237 temporarily.

[0190] The amount calculation means 2123 of contrast amendments acquires the amount of amendments from the amendment image in the white balance amendment means 231 like the above. The contrast amendment means 232 returns the amendment image to the amount acquisition means 29 of amendments while it amends to the amendment image in the white balance amendment means 231 accumulated in the amendment image buffer 237 temporarily based on the amount of amendments acquired with the amount calculation means 2123 of contrast amendments and accumulates the amendment image in the amendment image buffer 237 temporarily.

[0191] The amount calculation means 2124 of exposure amendments acquires the amount of amendments from the amendment image in the contrast amendment means 232. The exposure amendment means 233 returns the amendment image to the amount acquisition means 29 of amendments while it amends to the amendment image in the contrast amendment means 232 accumulated in the amendment image buffer 237 temporarily based on the amount of amendments acquired with the amount calculation means 2124 of exposure amendments and accumulates the amendment image in the amendment image buffer 237 temporarily.
[0192] The amount calculation means 2125 of sharpness amendments acquires the amount of amendments from the amendment image in the exposure amendment means 233. The sharpness amendment means 235 returns the amendment image to the amount acquisition means 29 of amendments while it amends to the amendment image in the exposure amendment means 233 accumulated in the amendment image buffer 237 temporarily based on the amount of amendments acquired with the amount calculation means 2125 of sharpness amendments and accumulates the amendment image in the amendment image buffer 237 temporarily.
[0193] The desirable amount calculation means 2126 of color correction acquires the amount of amendments from the amendment image in the sharpness amendment means 235. The desirable color correction means 236 returns the amendment image to the amount acquisition means 29 of amendments while it amends to the amendment image in the sharpness amendment means 235 accumulated in the amendment image buffer 237 temporarily based on the amount of amendments acquired with the desirable amount calculation means 2126 of color correction and accumulates the amendment image in the amendment image buffer 237 temporarily.
[0194] Thus, when each amendment means of the image amendment means 30 amends based on the amount of amendments acquired with each calculation means of the amount acquisition means 29 of amendments and each calculation means of the amount acquisition means 29 of amendments acquires the amount of amendments from the amended image, more proper amendment can be performed to an input image. In addition, the location sequence of the above-mentioned amount calculation means of amendments and an amendment means is not restricted to drawing 24 and drawing 25 in order of a publication. moreover, the amount calculation means of amendments and any one or more means means of each amendment means may be missing, and other means may be added. In this case, as for above-mentioned deletion and an above-mentioned addition of each means, the amount calculation means of amendments and an amendment means are performed as a group, respectively.
[0195] Drawing 26 is the block diagram showing the configuration of the graphic display device by the 6th example of this invention. In drawing 26 , the graphic display device by the 6th example of this invention is equipment using the above-mentioned image processor, and consists of an image input means 1 and an image display device 10.
[0196] The image input means 1 is the same as that of the 1st example of this invention. The image display device 10 consists of a data processor 2, storage 3, and an image display means (monitor) 11. Here, a data processor 2 and storage 3 are the same as that of the 1st example of this invention. The image display means 11 are a CRT (cathode-ray tube) monitor, a liquid crystal display monitor, etc.
[0197] If dynamic-image data is inputted from the image input means 1, amendment of white balance amendment, contrast amendment, exposure amendment, saturation amendment, sharpness amendment, etc. will be performed and high-definition-ized by the data processor 2 and storage 3 to this dynamic image like processing by the 1st example of this invention. except for the amendment which raised the amendment performed to an image here and which there need to be no five all and was raised here -- for example, high definition-ized amendment like desirable color correction can also be added. The image with which this amendment was performed and high-definition-ized is displayed on the image display means 11.
[0198] Drawing 27 is the block diagram showing the configuration of the image processor by the 7th example of this invention. In drawing 27 , the image processor by the 7th example of this invention is equipped with the record medium 15 which recorded the program of the above-mentioned image art.
[0199] That is, the image processor by the 7th example of this invention consists of record media 15 which memorized the program which is performed with the image input unit 12 which inputs a dynamic image, the personal computer (it considers as a personal computer hereafter) 13 which processes a program, the image display device 14 which displays a processing result, and a personal computer 13, and realizes the above-mentioned image art.
[0200] If a dynamic image is inputted into a personal computer 13 from the image input unit 12, a personal computer 13 will amend to a dynamic image based on the program of the image art which performs automatic high definition-ization of the dynamic image currently recorded on the record medium 15. The dynamic image with which amendment was performed is sent to an image display device 14, and is displayed.
[0201]
[Effect of the Invention] As explained above, in case the image by which a sequential input is carried out is high-

definition-ized according to this invention By acquiring the amount of amendments from each frame image which constitutes an input dynamic image, in order to high-definition--ization-amend an input dynamic image, and performing high definition-ized amendment to a frame image based on the acquired amount of amendments According to the image quality of an input dynamic image, the amount of amendments can be changed accommodative, and it is effective in the ability to high-definition-ize a dynamic image automatically.

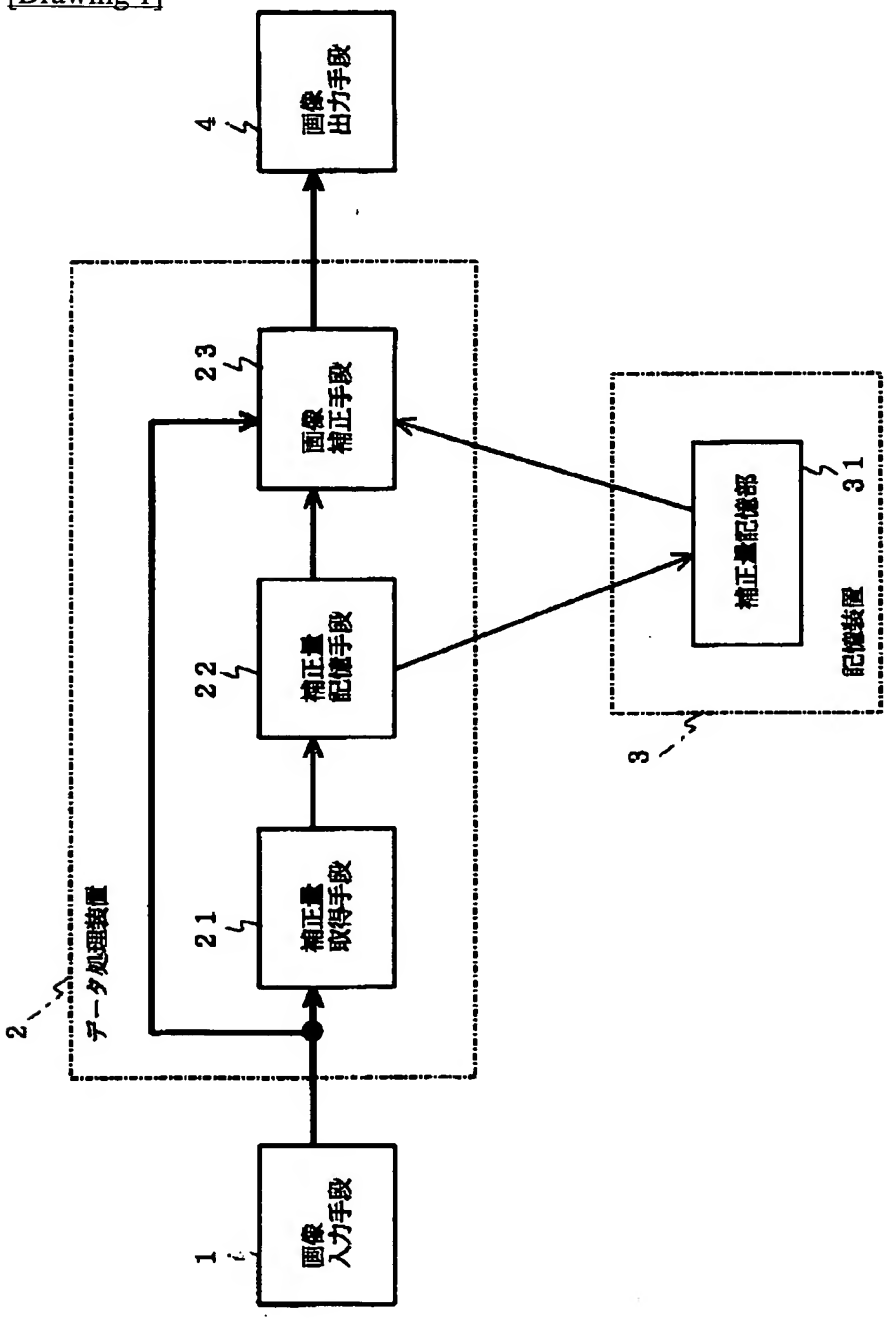
[Translation done.]

* NOTICES *

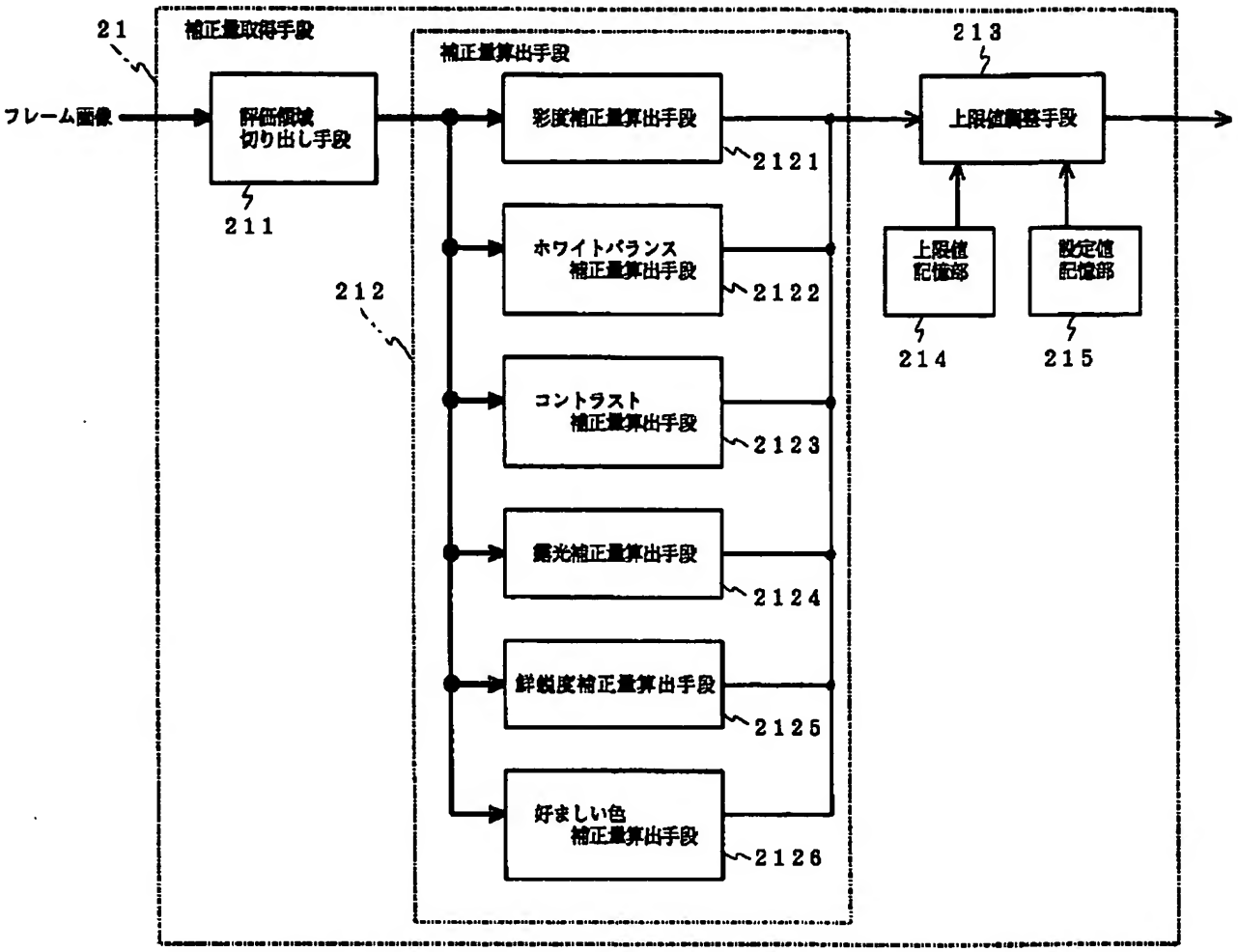
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

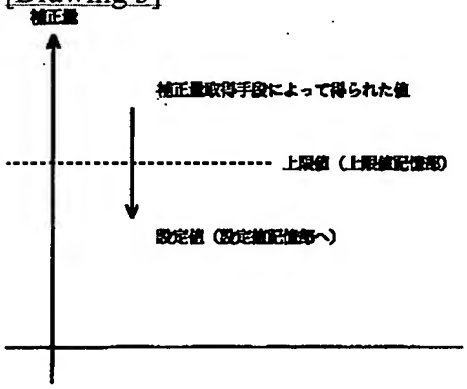
[Drawing 1]



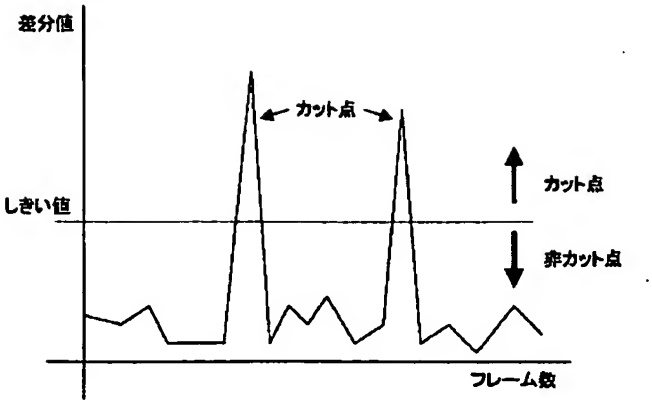
[Drawing 2]



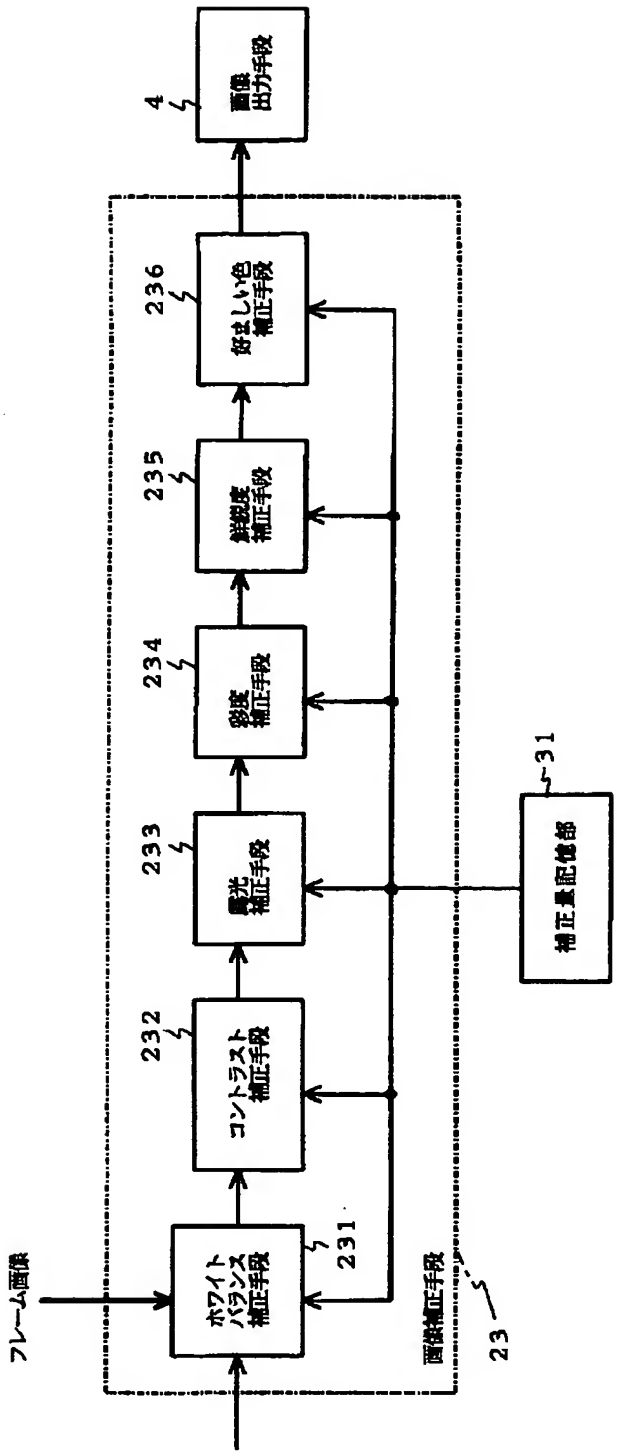
[Drawing 3]



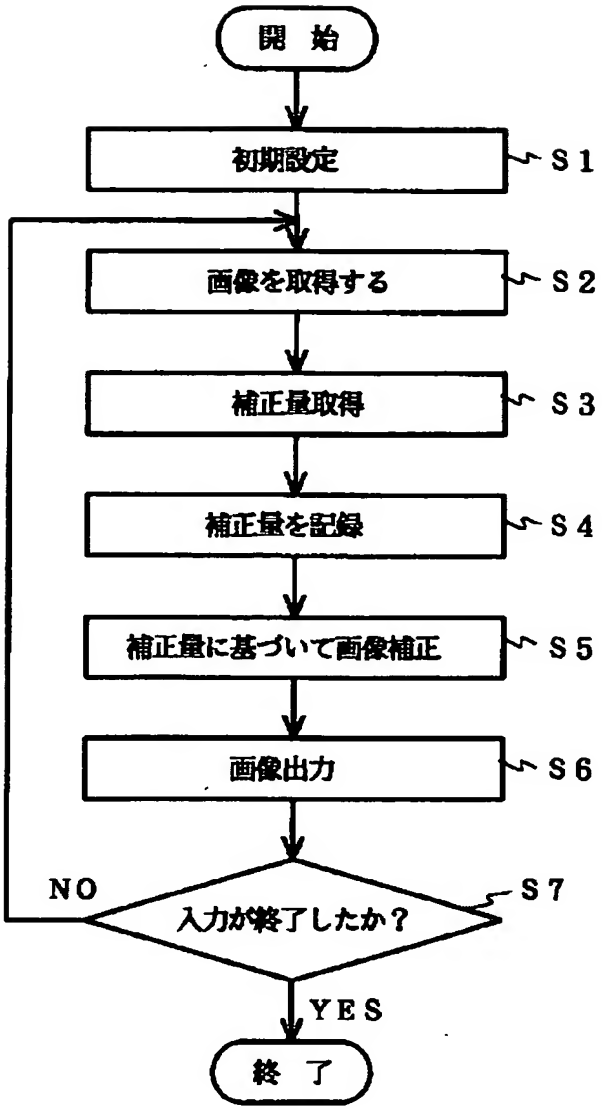
[Drawing 16]



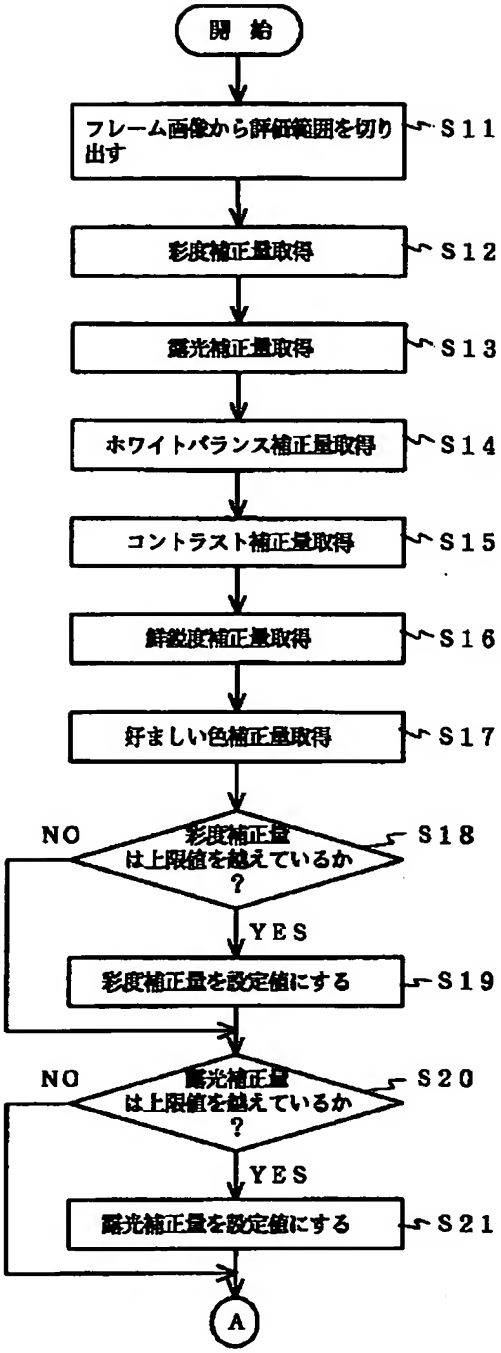
[Drawing 4]


フレーム画像
ホワイトバランス補正手段
231
コントラスト補正手段
232
露光補正手段
233
彩度補正手段
234
鮮鋭度補正手段
235
好ましい色補正手段
236
画像出力手段
4
画像補正手段
23
補正量記憶部
31

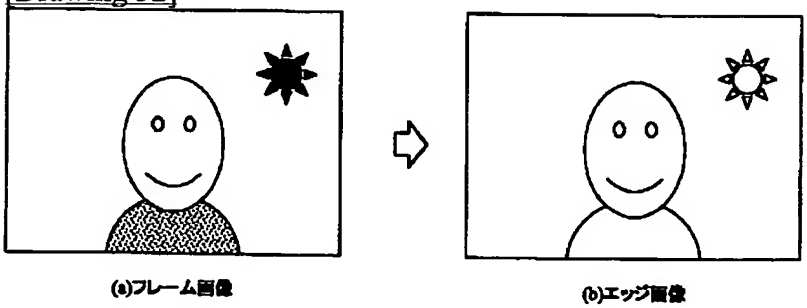
[Drawing 5]


開 始
初期設定
S 1
画像を取得する
S 2
補正量取得
S 3
補正量を記録
S 4
補正量に基づいて画像補正
S 5
画像出力
S 6
NO
入力が終了したか？
S 7
YES
終 了

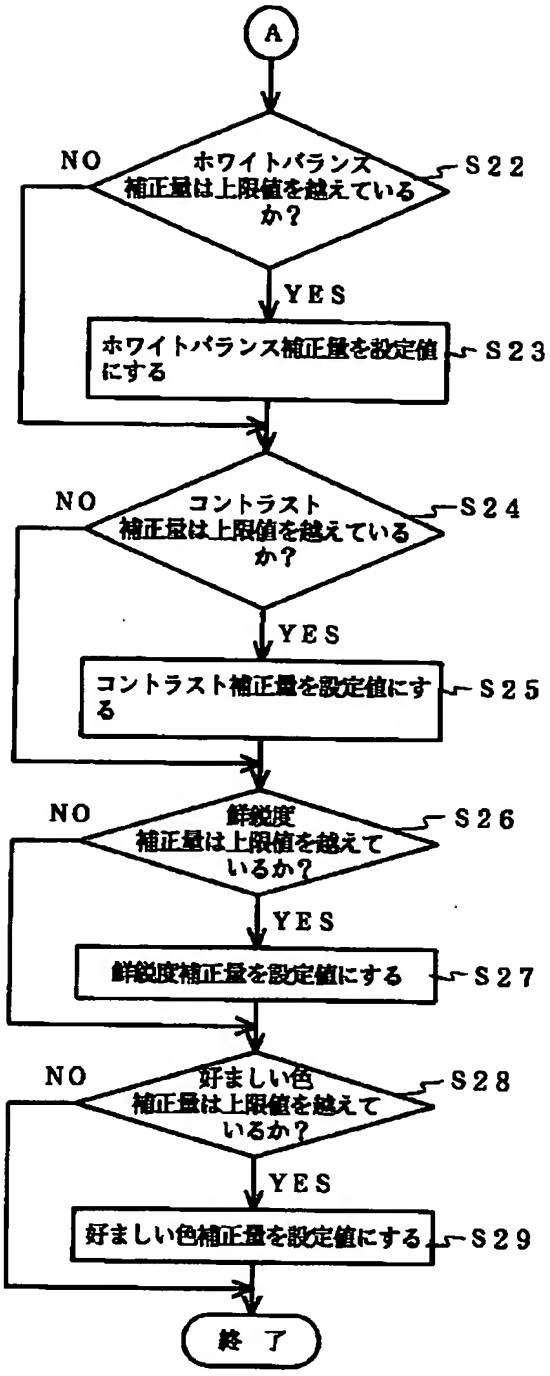
[Drawing 6]



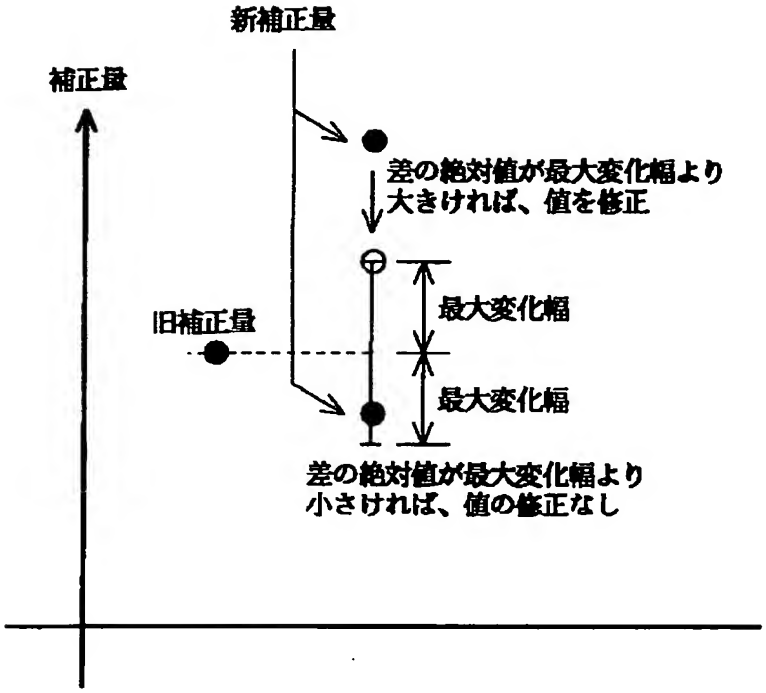
[Drawing 32]



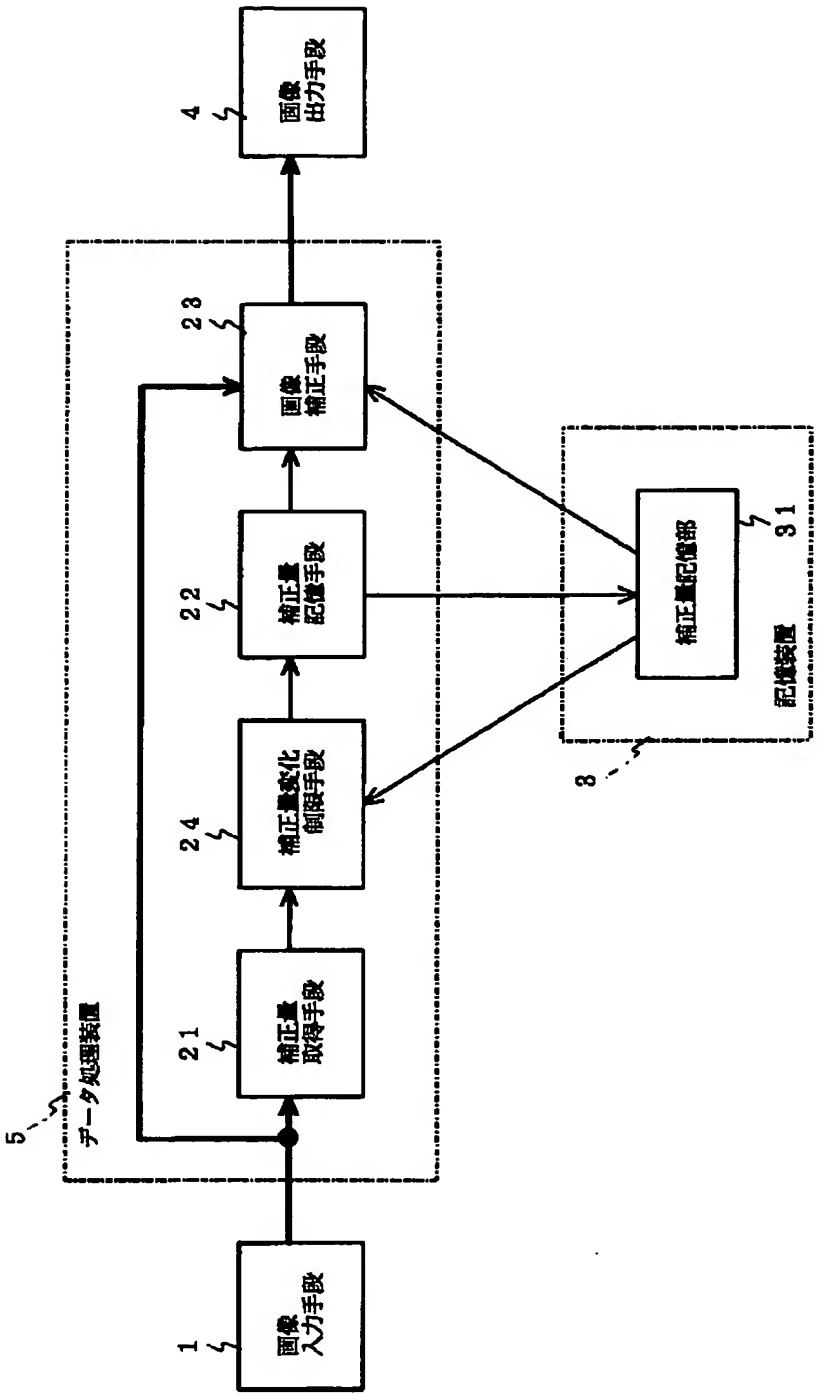
[Drawing 7]


A
NO
ホワイトバランス補正量は上限値を越えているか？
S22
YES
ホワイトバランス補正量を設定値にする
S23
NO
コントラスト補正量は上限値を越えているか？
S24
YES
コントラスト補正量を設定値にする
S25
NO
鮮鋭度補正量は上限値を越えているか？
S26
YES
鮮鋭度補正量を設定値にする
S27
NO
好ましい色補正量は上限値を越えているか？
S28
YES
好ましい色補正量を設定値にする
S29
終了

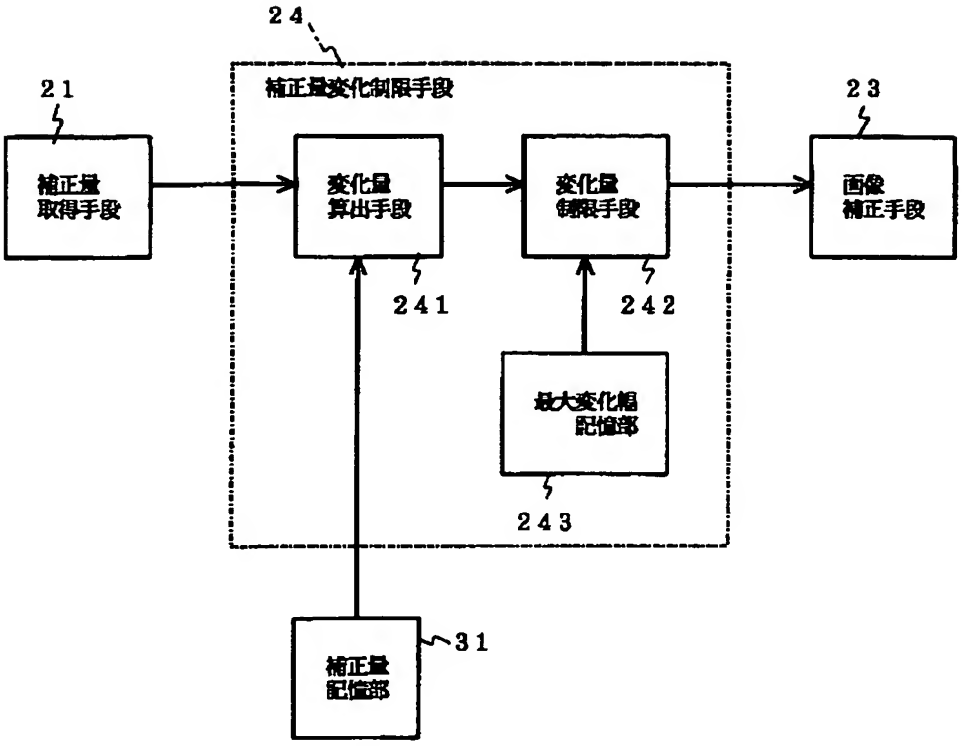
[Drawing 10]


新補正量
補正量
差の絶対値が最大変化幅より
大きければ、値を修正
最大変化幅
旧補正量
最大変化幅
差の絶対値が最大変化幅より
小さければ、値の修正なし

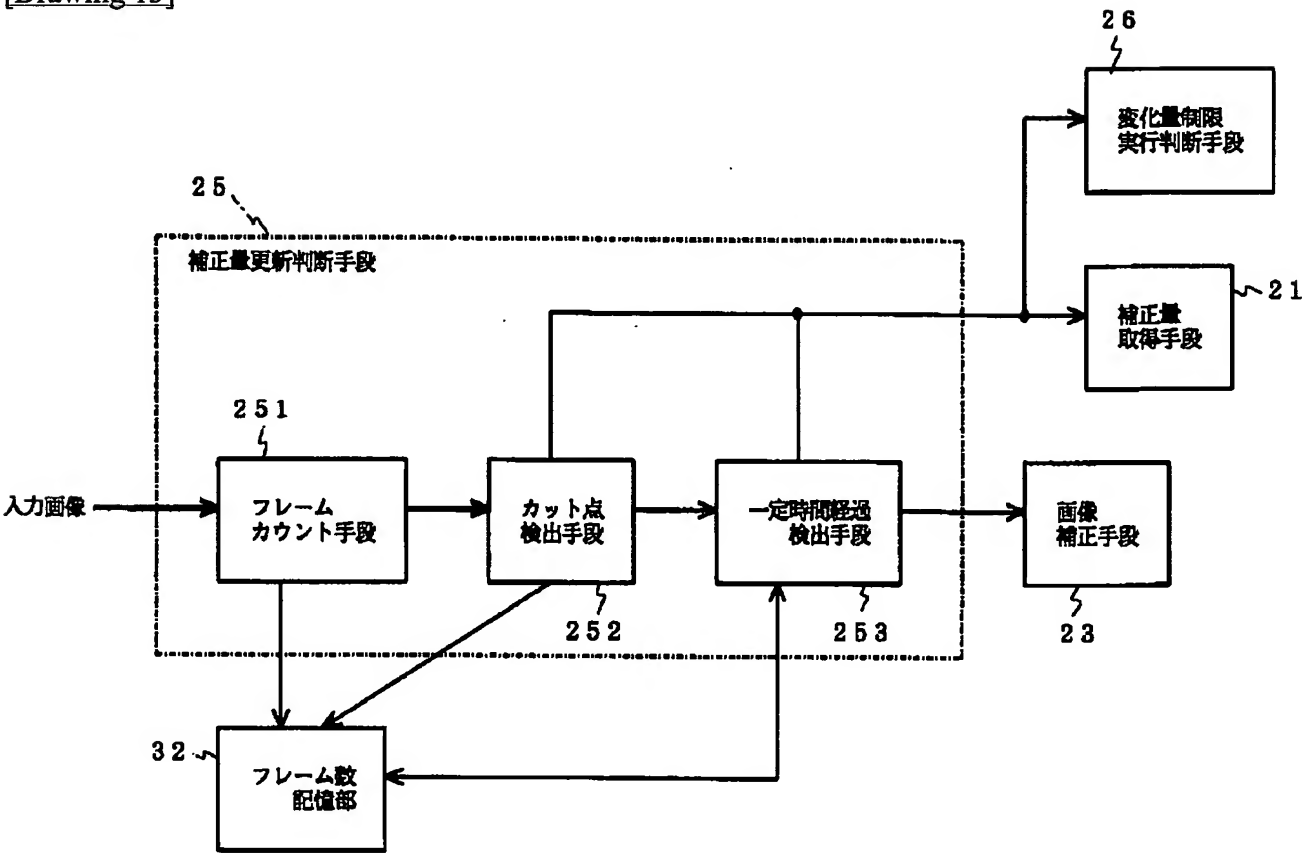
[Drawing 8]


1
画像
入力手段
21
補正量
取得手段
24
補正量変化
制限手段
22
補正量
記憶手段
23
画像
補正手段
4
画像
出力手段
5
データ処理装置
31
補正量記憶部
8
記憶装置

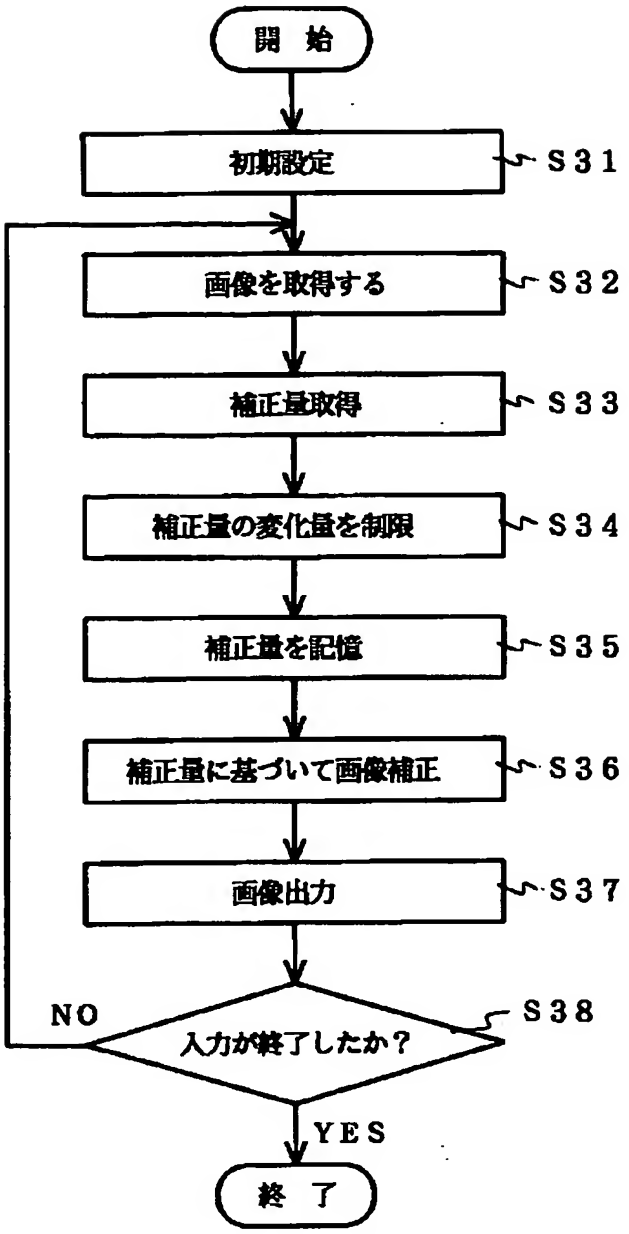
[Drawing 9]



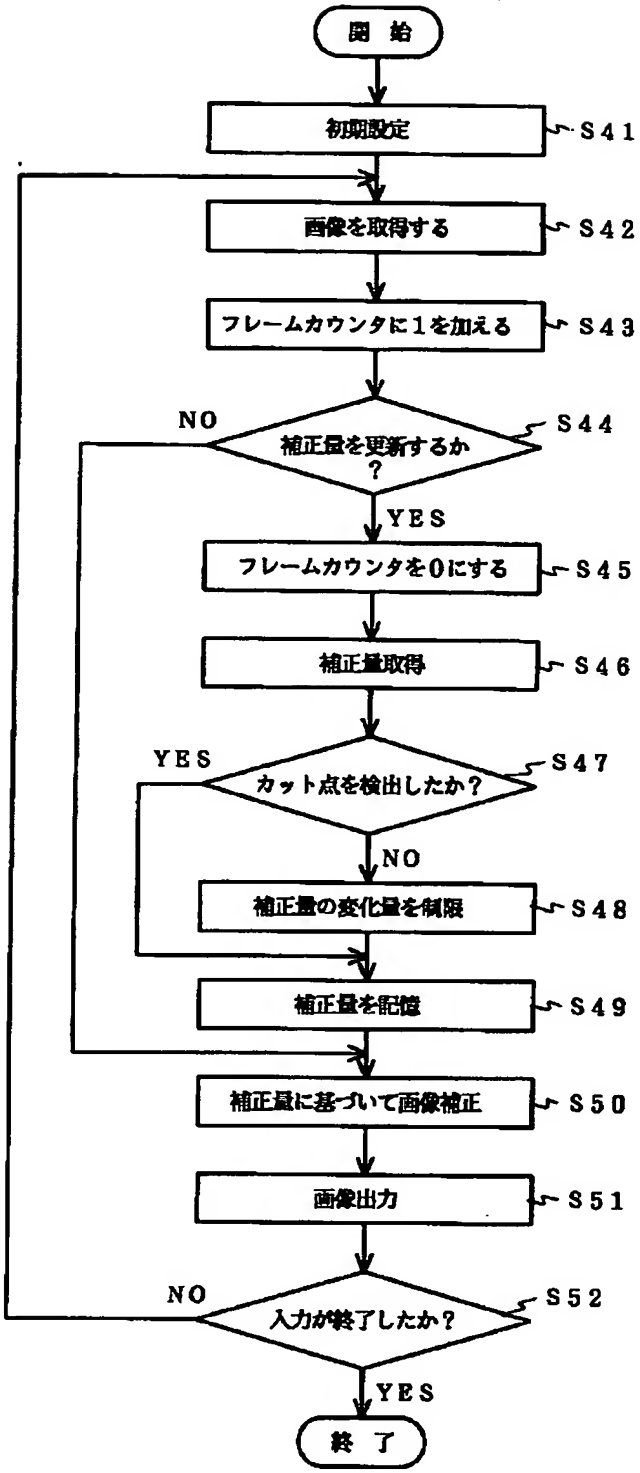
[Drawing 13]



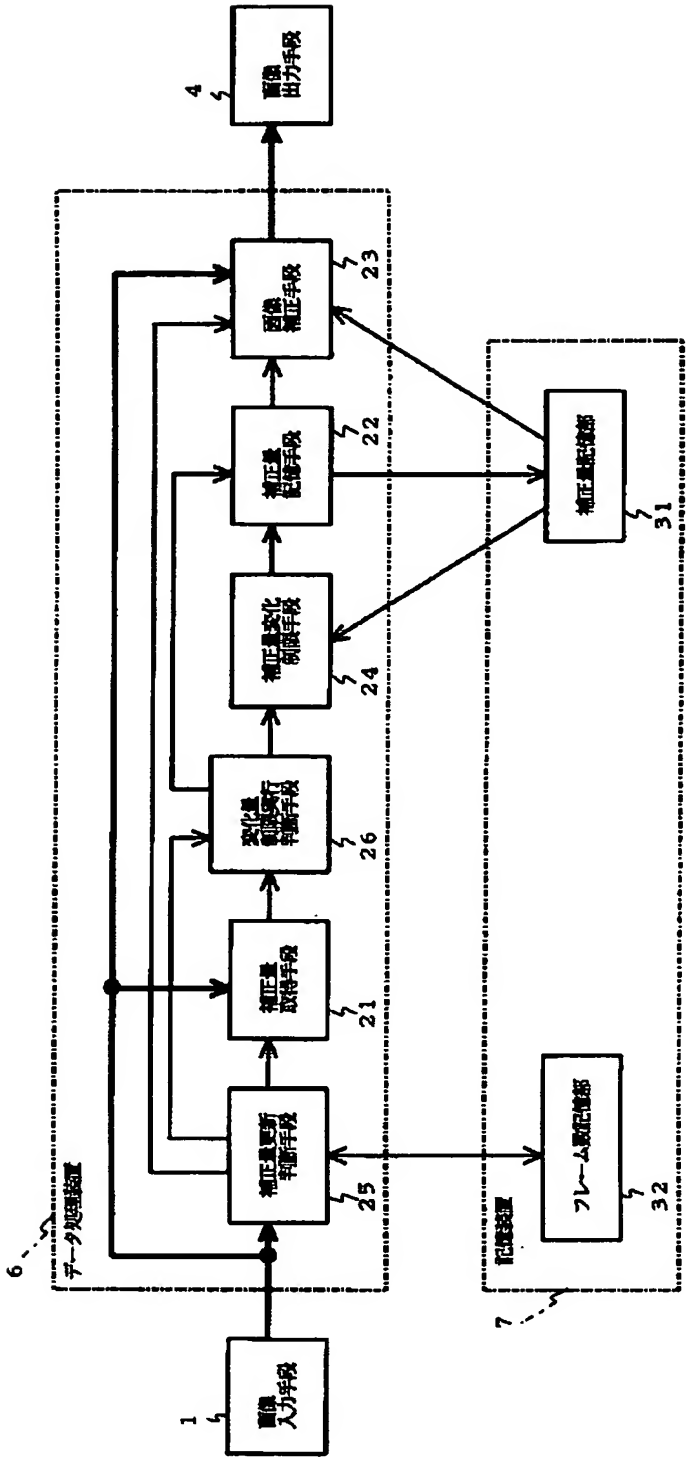
[Drawing 11]


開 始
初期設定
S31
画像を取得する
S32
補正量取得
S33
補正量の変化量を制限
S34
補正量を記憶
S35
補正量に基づいて画像補正
S36
画像出力
S37
NO
入力が終了したか？
S38
YES
終 了

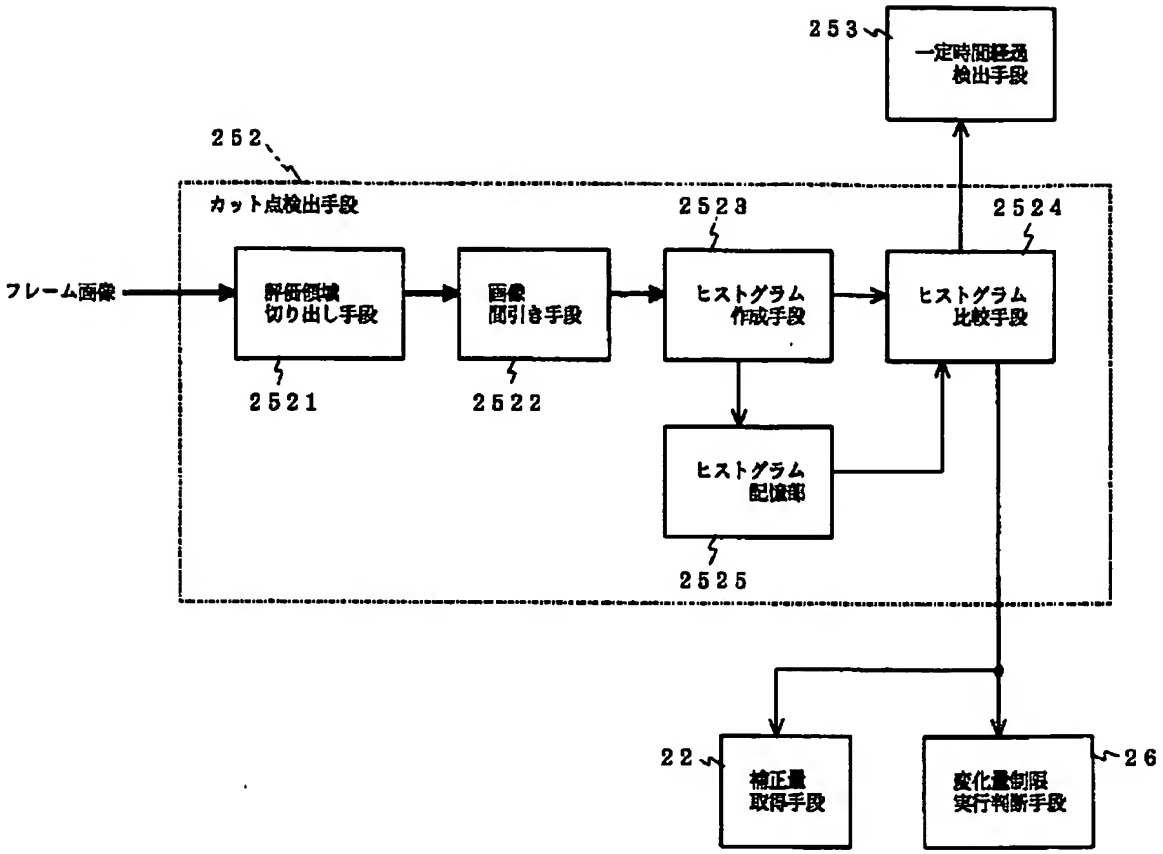
[Drawing 17]


開 始
初期設定
S41
画像を取得する
S42
フレームカウンタに1を加える
S43
NO
補正量を更新するか？
S44
YES
フレームカウンタを0にする
S45
補正量取得
S46
YES
カット点を検出したか？
S47
NO
補正量の変化量を制限
S48
補正量を記憶
S49
補正量に基づいて画像補正
S50
画像出力
S51
NO
入力が終了したか？
S52
YES
終 了

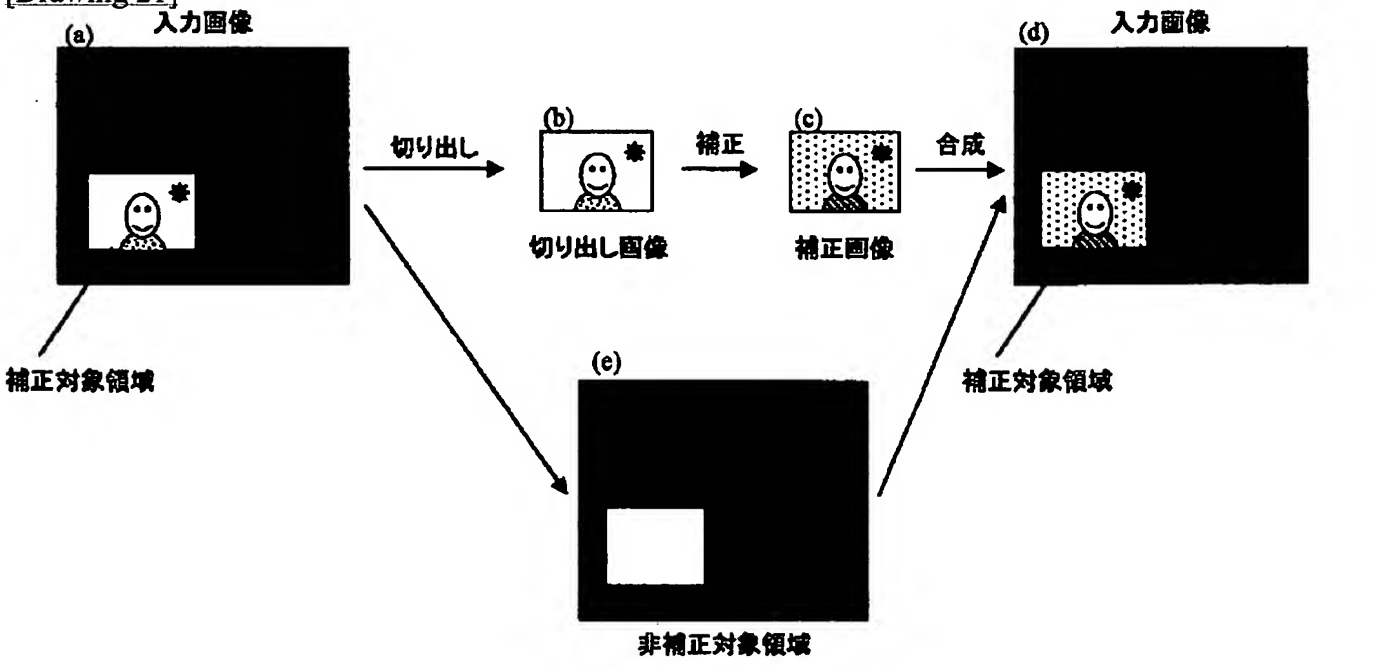
[Drawing 12]


4
画像出力手段
23
画像補正手段
22
補正量記憶手段
31
補正量記憶部
24
補正量変化制限手段
26
変化量制限実行判断手段
21
補正量取得手段
25
補正量変更判断手段
32
フレーム数記憶部
1
画像入力手段
6
7

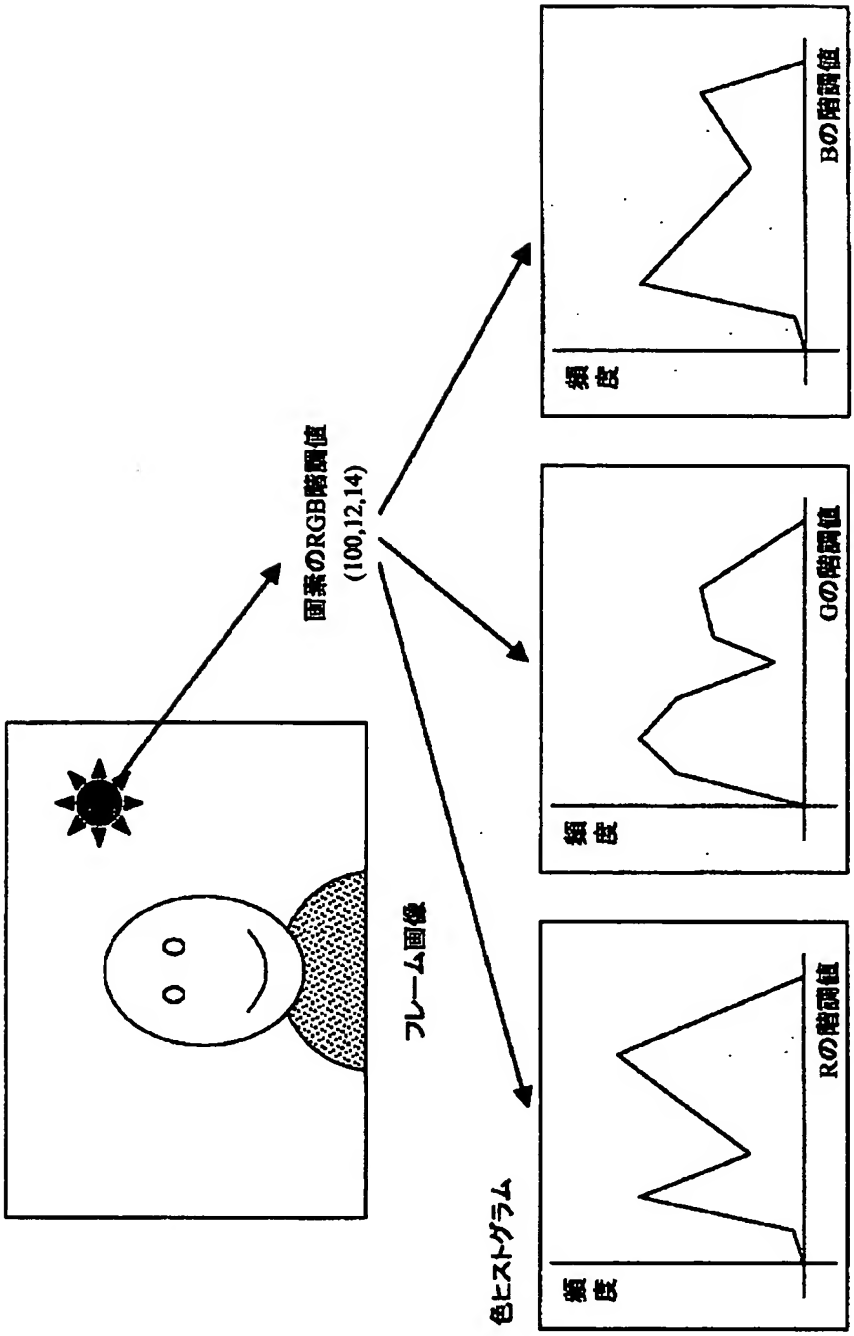
[Drawing 14]



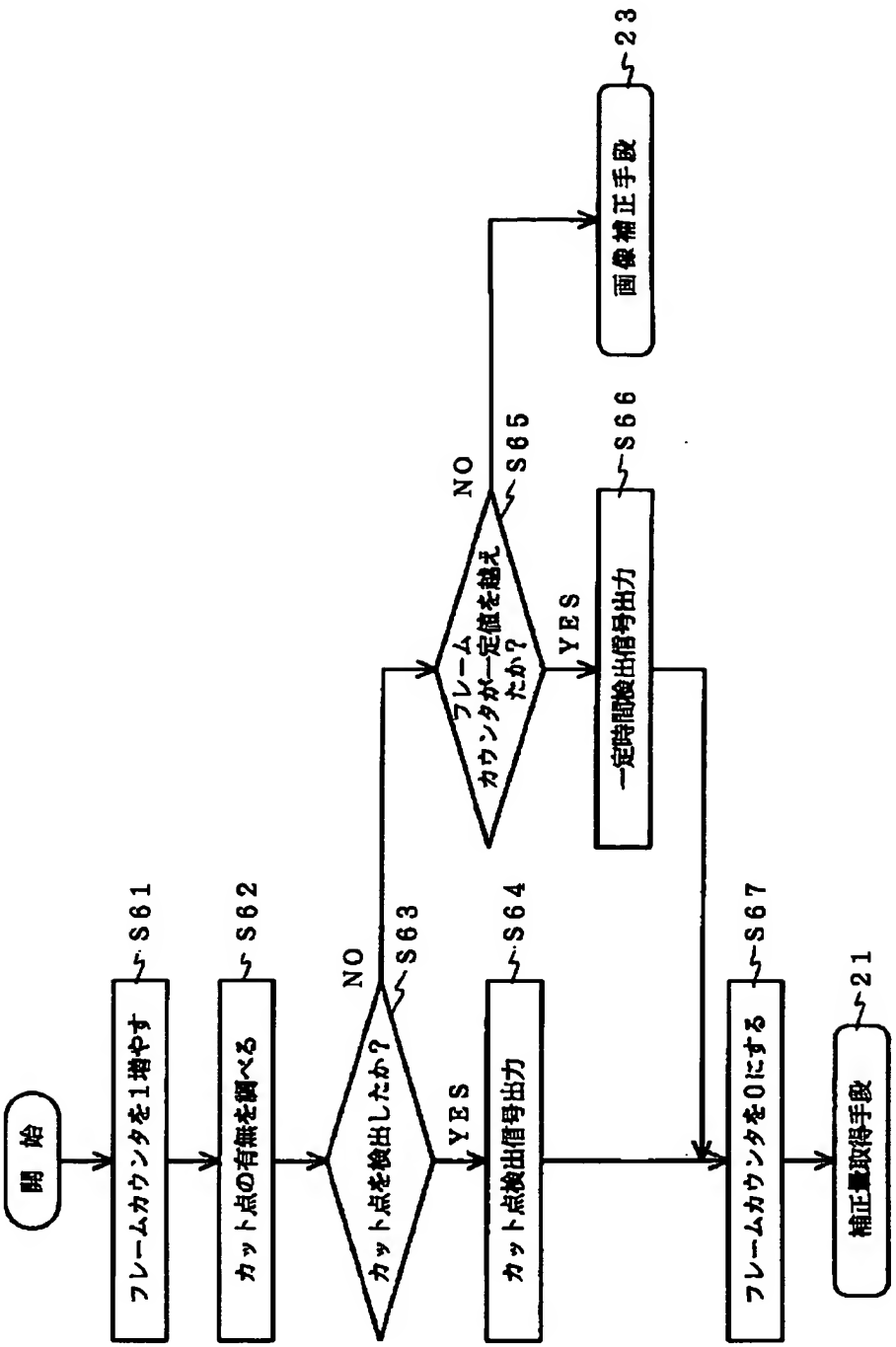
[Drawing 21]



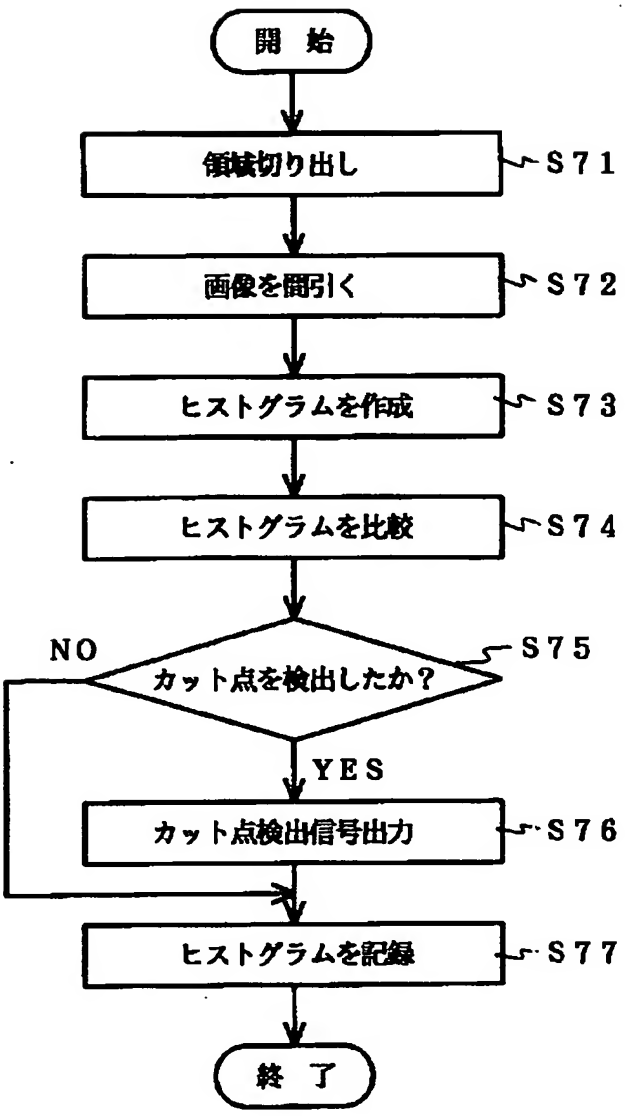
[Drawing 15]


画素のRGB階調値
(100,12,14)
フレーム画像
色ヒストグラム
頻度
Rの階調値
頻度
Gの階調値
頻度
Bの階調値

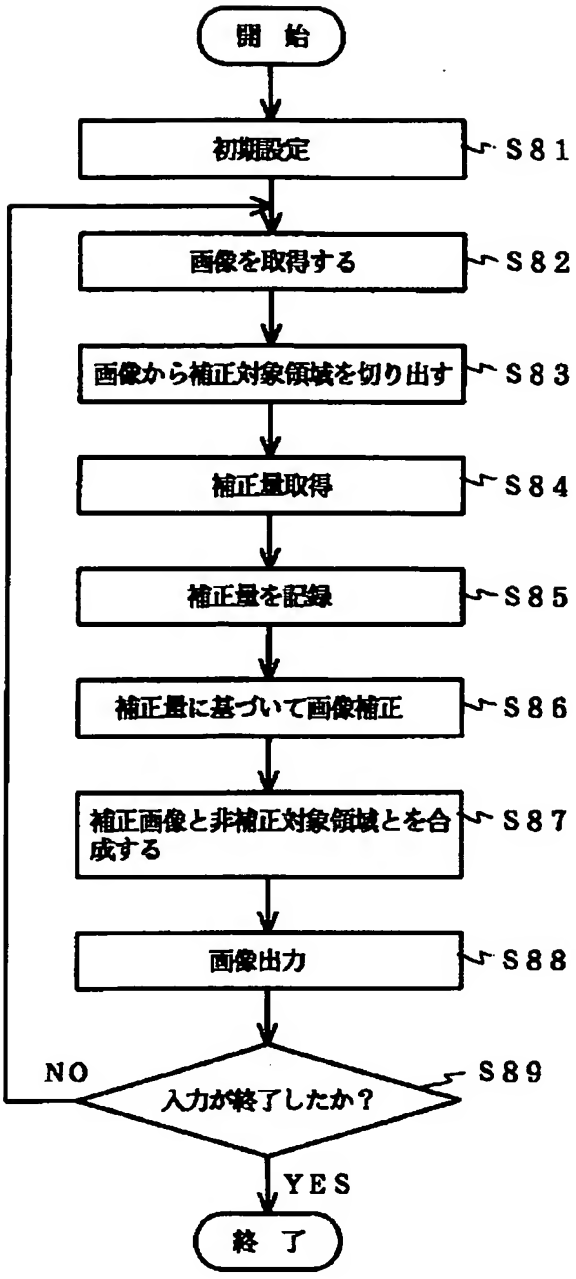
[Drawing 18]


開始
フレームカウンタを1増やす
S61
カット点の有無を調べる
S62
カット点を検出したか?
S63
NO
YES
カット点検出信号出力
S64
フレームカウンタが一定値を越えたか?
S65
NO
YES
一定時間検出信号出力
S66
フレームカウンタを0にする
S67
補正量取得手段
21
画像補正手段
23

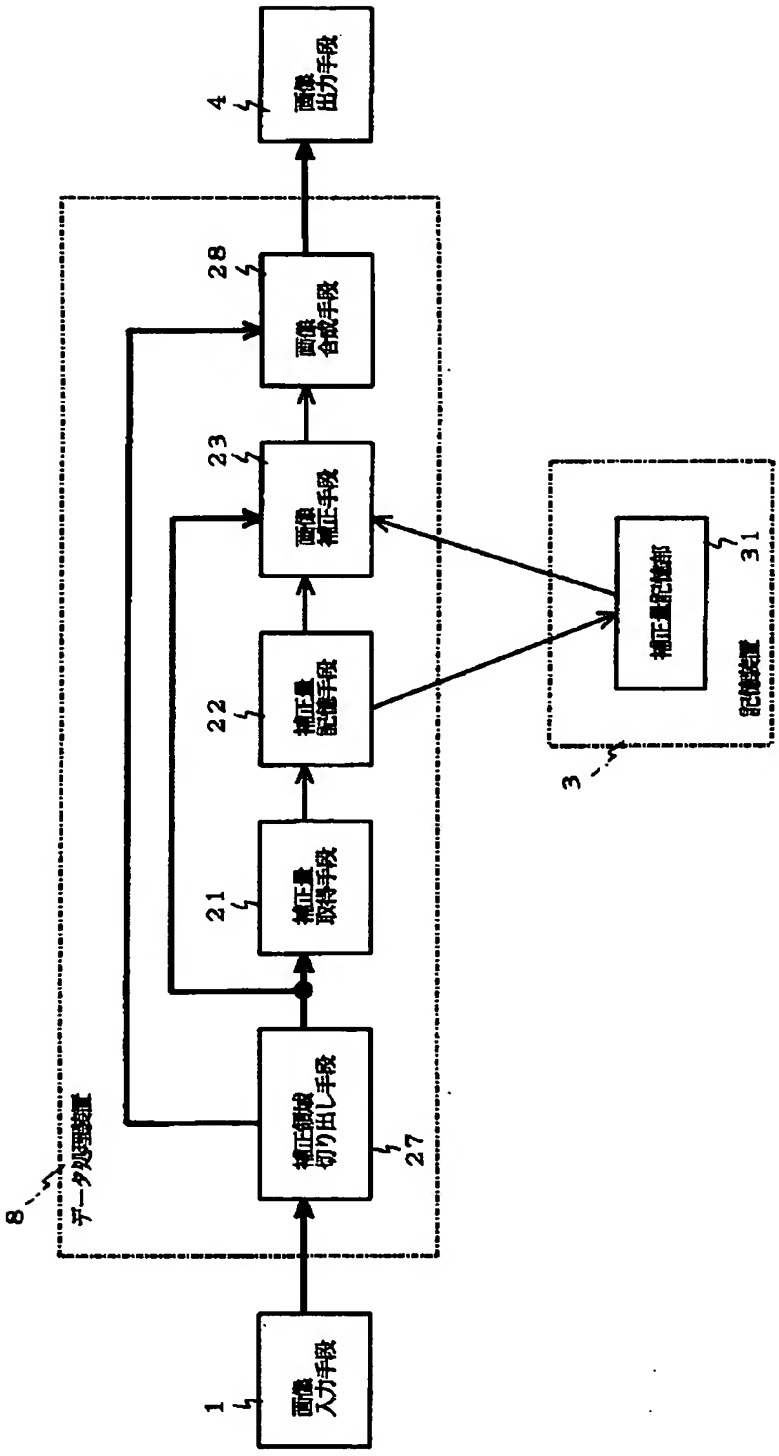
[Drawing 19]


開 始
領域切り出し
S71
画像を間引く
S72
ヒストグラムを作成
S73
ヒストグラムを比較
S74
NO
カット点を検出したか？
S75
YES
カット点検出信号出力
S76
ヒストグラムを記録
S77
終 了

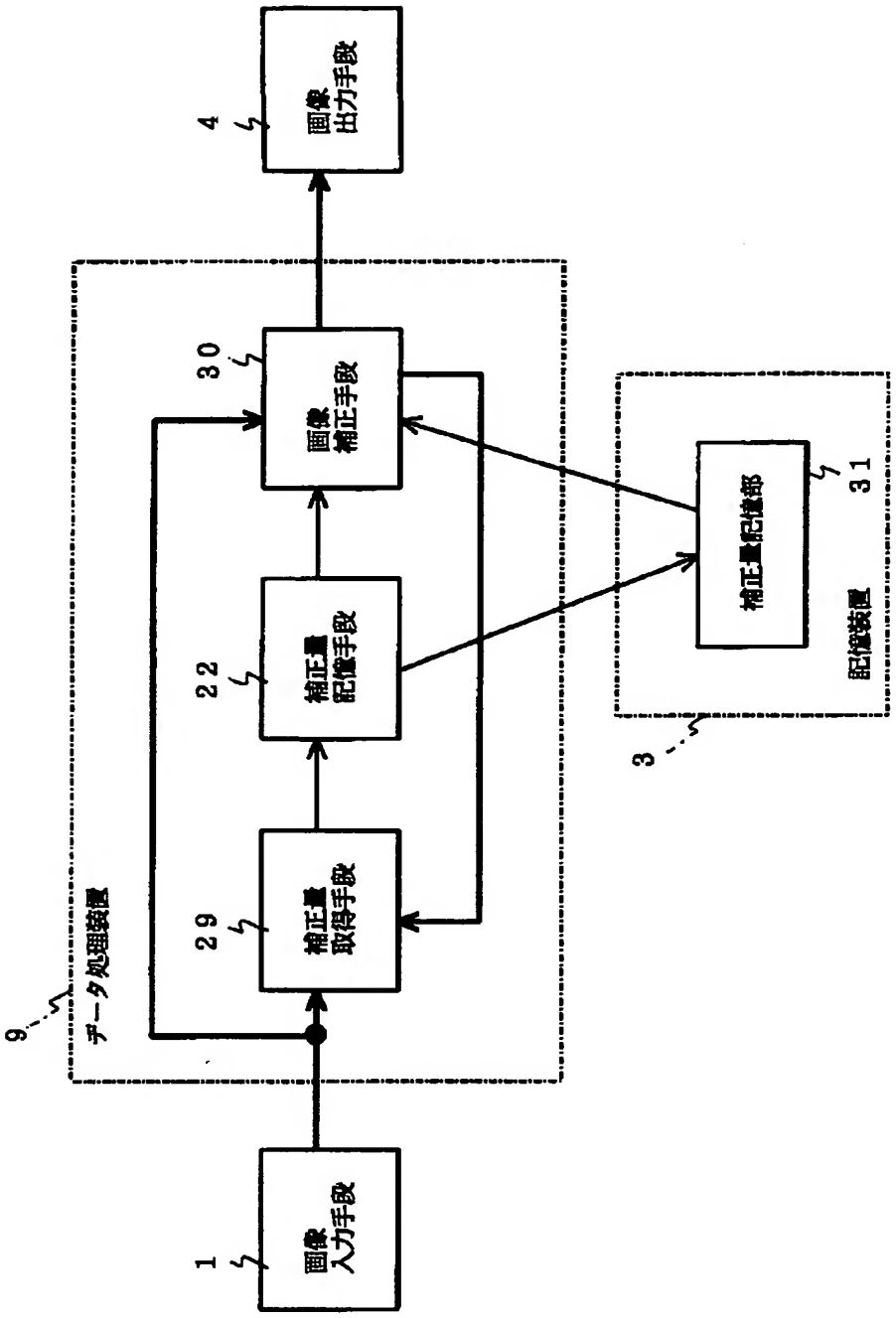
[Drawing 22]


開 始
初期設定
S81
画像を取得する
S82
画像から補正対象領域を切り出す
S83
補正量取得
S84
補正量を記録
S85
補正量に基づいて画像補正
S86
補正画像と非補正対象領域とを合成する
S87
画像出力
S88
NO
入力が終了したか？
S89
YES
終 了

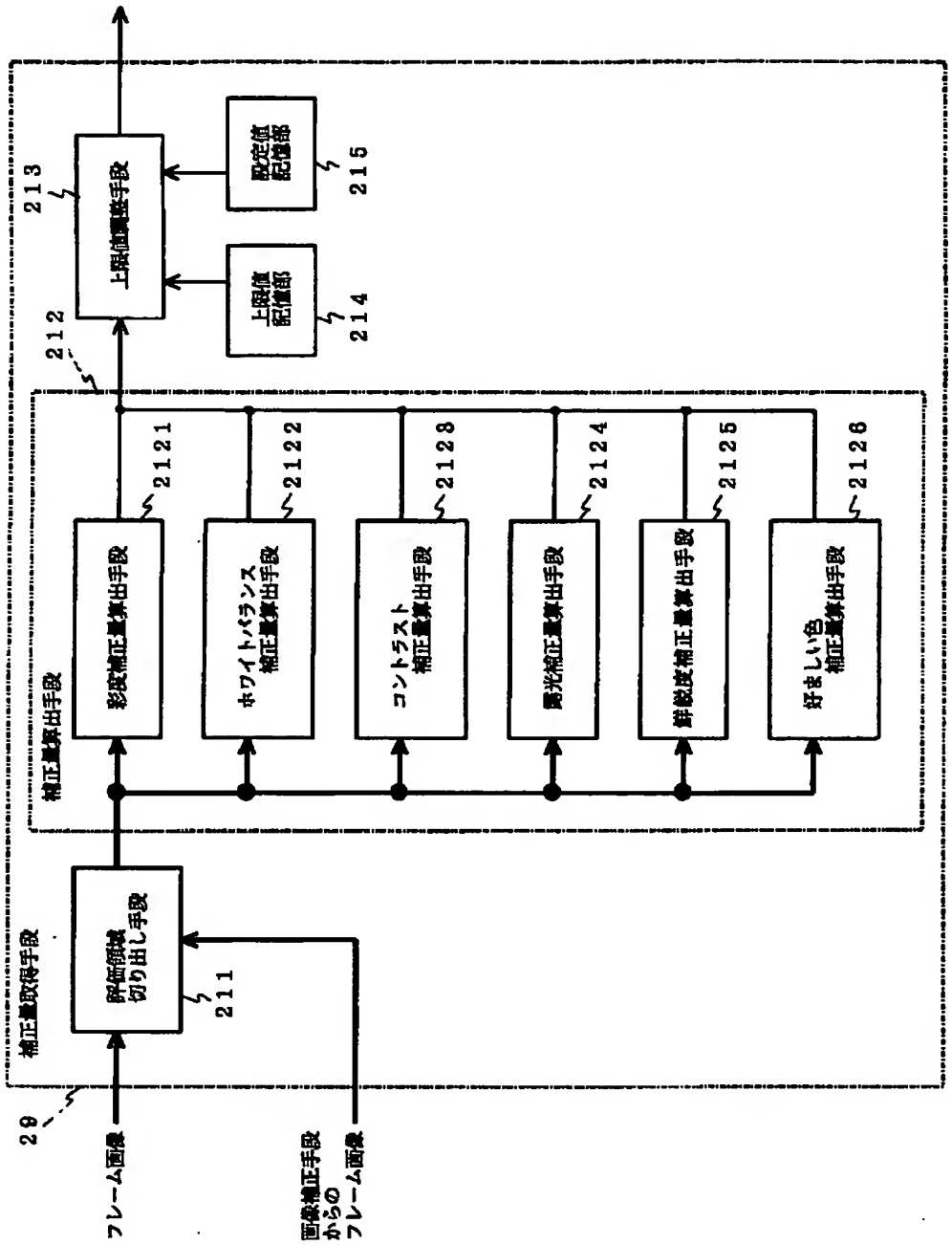
[Drawing 20]


画像入力手段
1
補正領域切り出し手段
27
補正量取得手段
21
補正量記憶手段
22
画像補正手段
23
画像合成手段
28
画像出力手段
4
データ処理装置
8
補正量記憶部
31
記憶装置
3

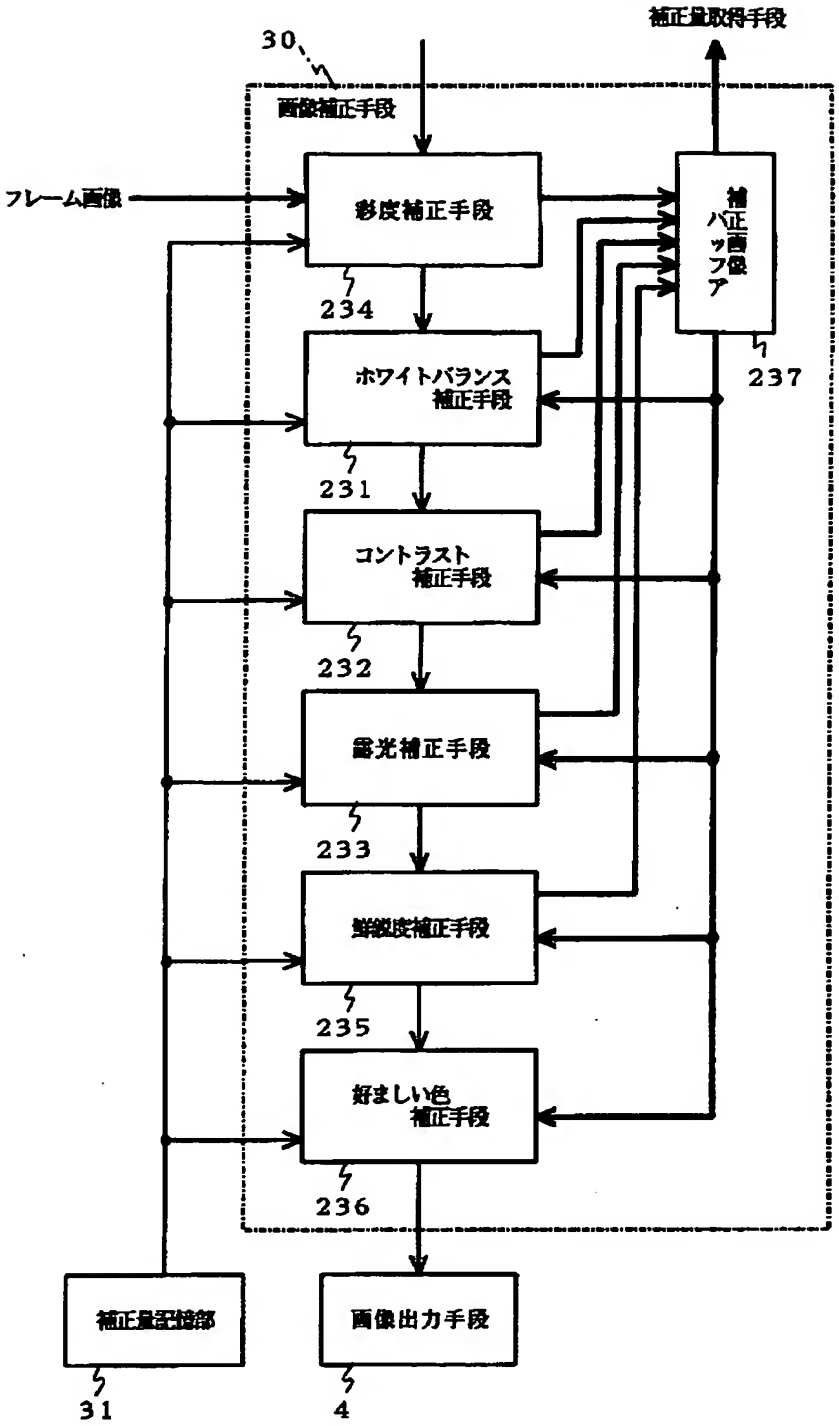
[Drawing 23]


画像
入力手段
1
補正量
取得手段
29
補正量
記憶手段
22
画像
補正手段
30
画像
出力手段
4
データ処理装置
9
補正量記憶部
31
記憶装置
3

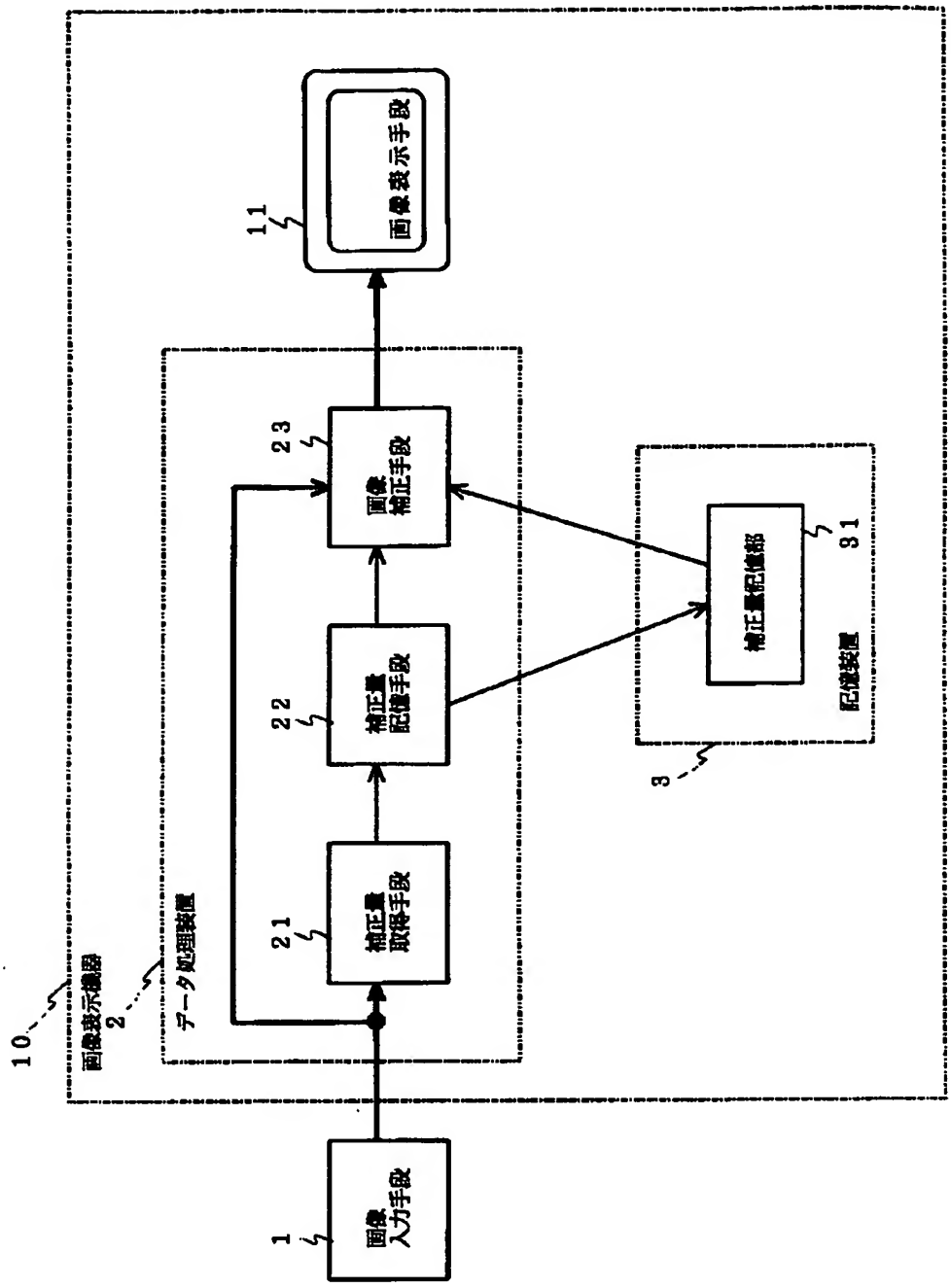
[Drawing 24]


20
補正量取得手段
評価領域切り出し手段
211
フレーム画像
画像補正手段からのフレーム画像
補正量算出手段
彩度補正量算出手段
2121
ホワイトバランス補正量算出手段
2122
コントラスト補正量算出手段
2123
露光補正量算出手段
2124
鮮鋭度補正量算出手段
2125
好ましい色補正量算出手段
2126
212
上限値調整手段
213
上限値記憶部
214
設定値記憶部
215

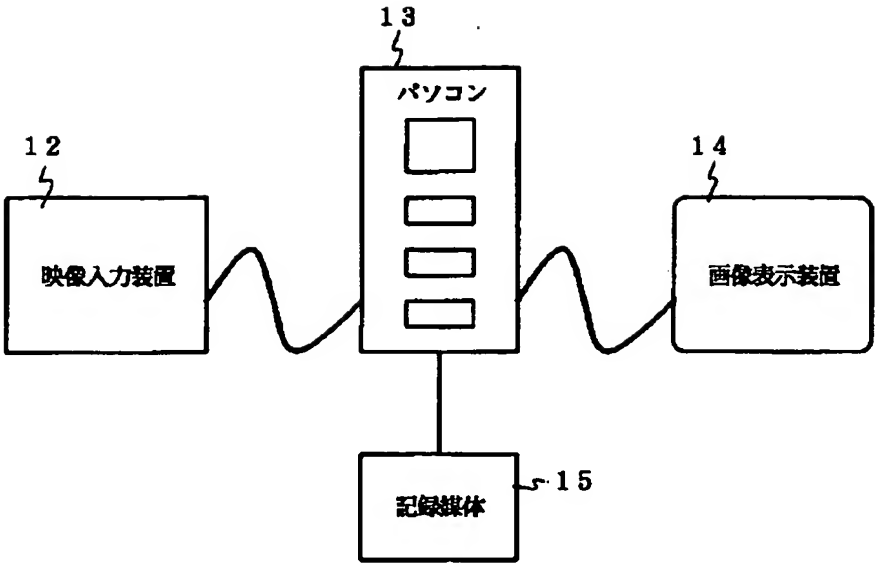
[Drawing 25]


補正量取得手段
30
画像補正手段
フレーム画像
彩度補正手段
234
補正画像バッファ
237
ホワイトバランス補正手段
231
コントラスト補正手段
232
露光補正手段
233
鮮鋭度補正手段
235
好ましい色補正手段
236
補正量記憶部
31
画像出力手段
4

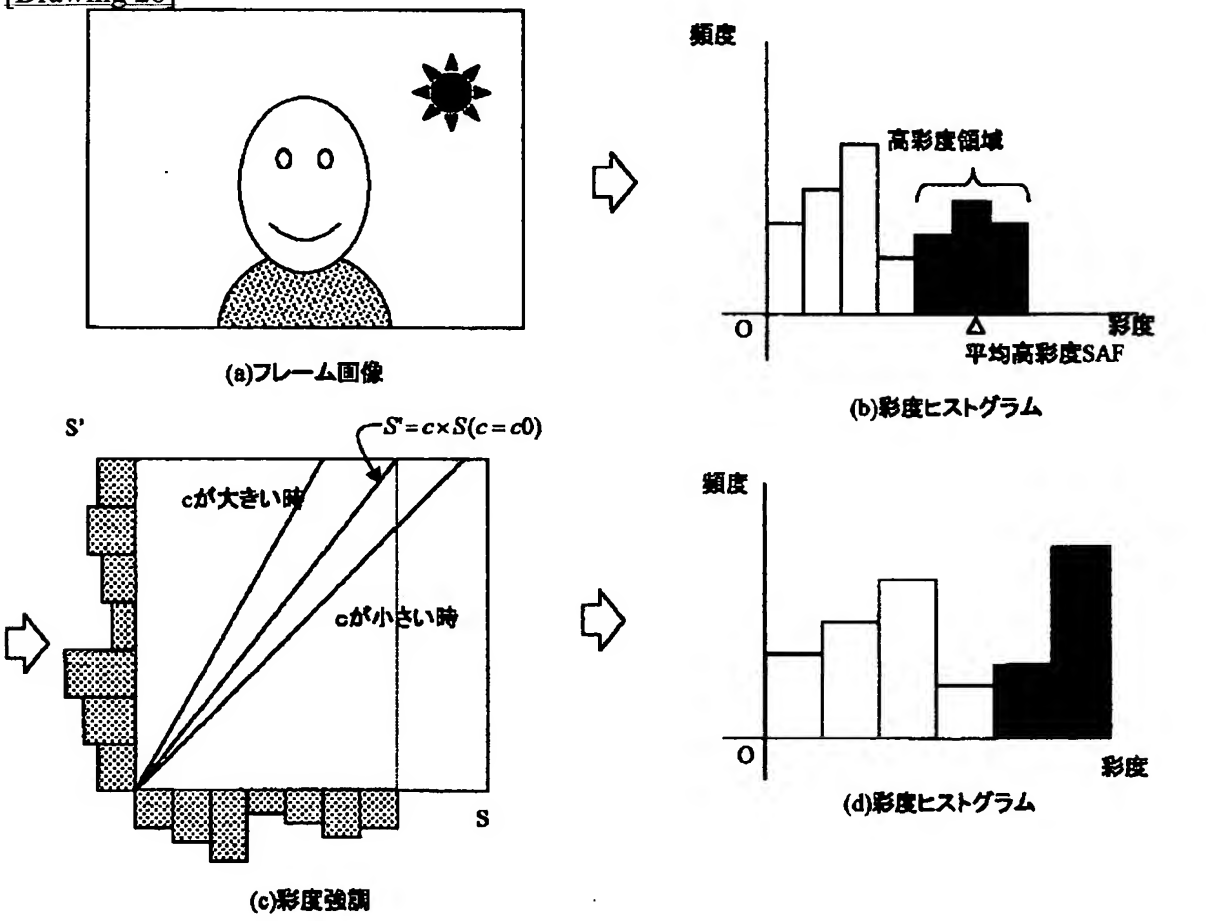
[Drawing 26]


画像表示装置
10
データ処理装置
2
画像入力手段
1
補正量取得手段
21
補正量記憶手段
22
画像補正手段
23
画像表示手段
11
記憶装置
3
補正量記憶部
31

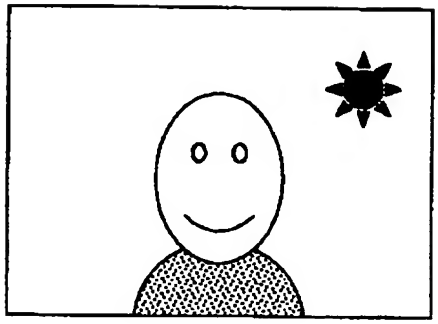
[Drawing 27]



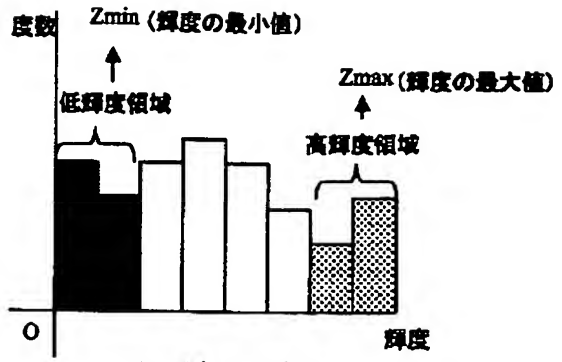
[Drawing 28]



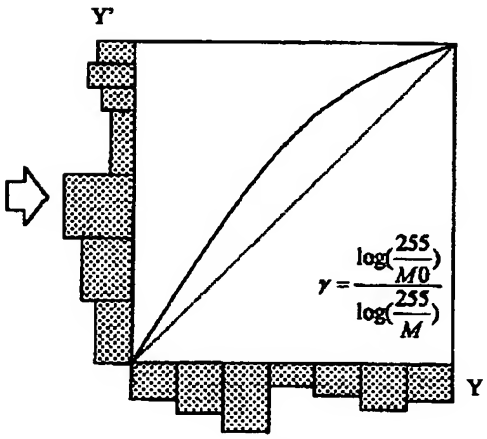
[Drawing 29]



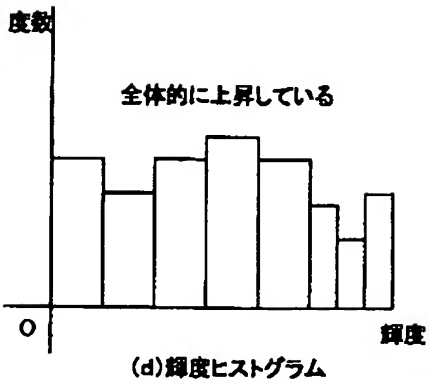
(a)フレーム画像



(b)輝度ヒストグラム

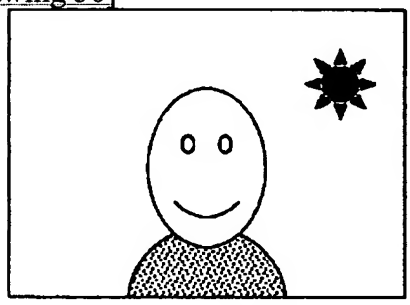


(c)露光補正

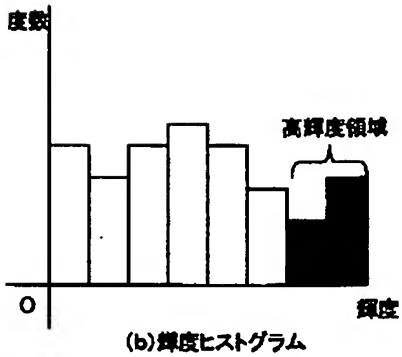


(d)輝度ヒストグラム

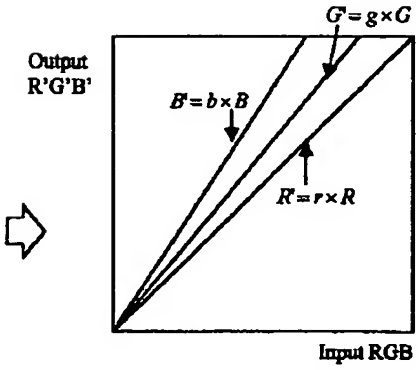
[Drawing 30]



(a)フレーム画像

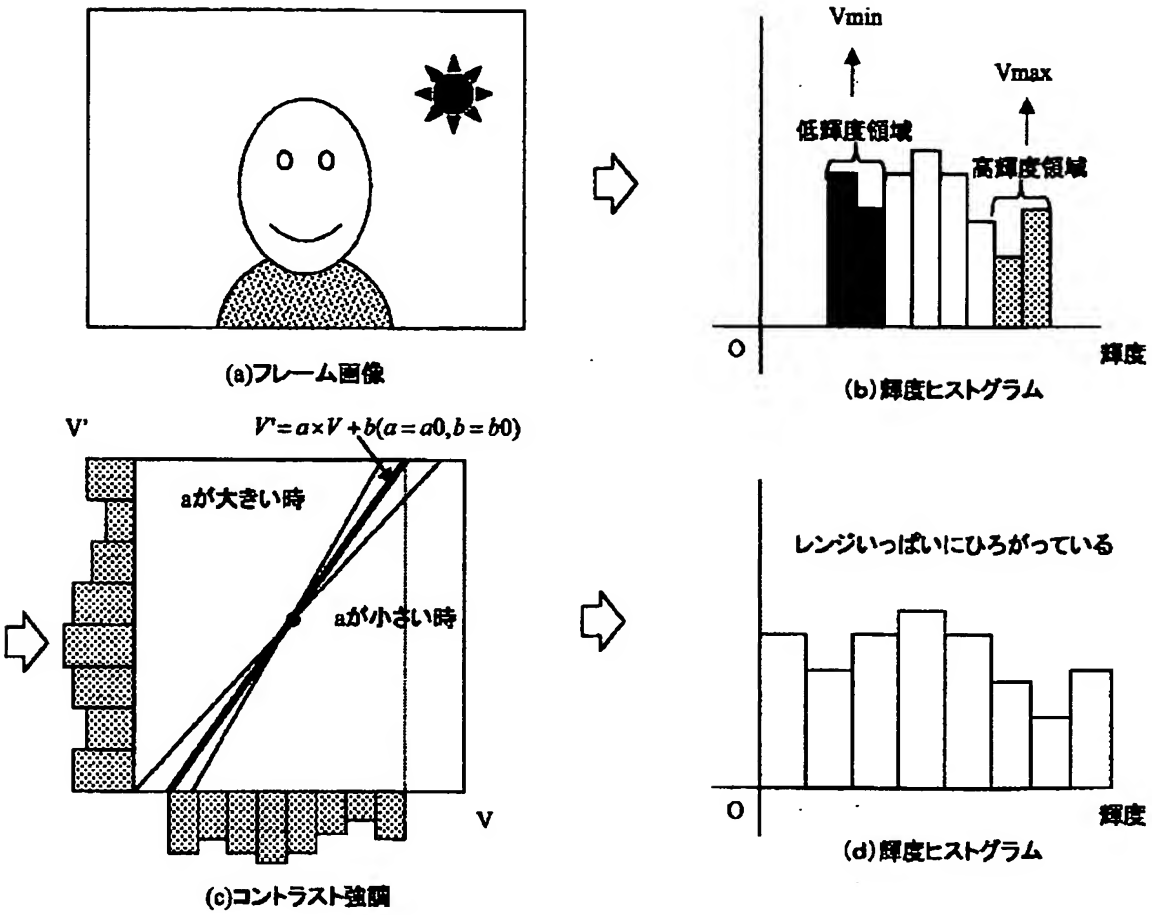


(b)輝度ヒストグラム

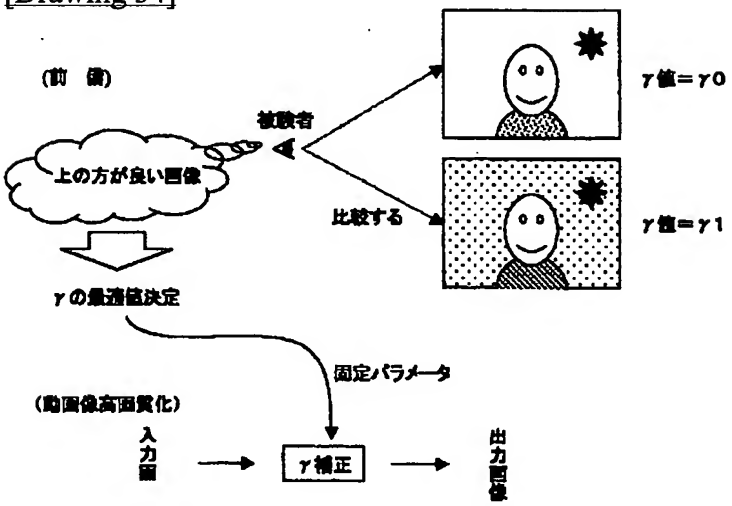


(c)ホワイトバランス補正

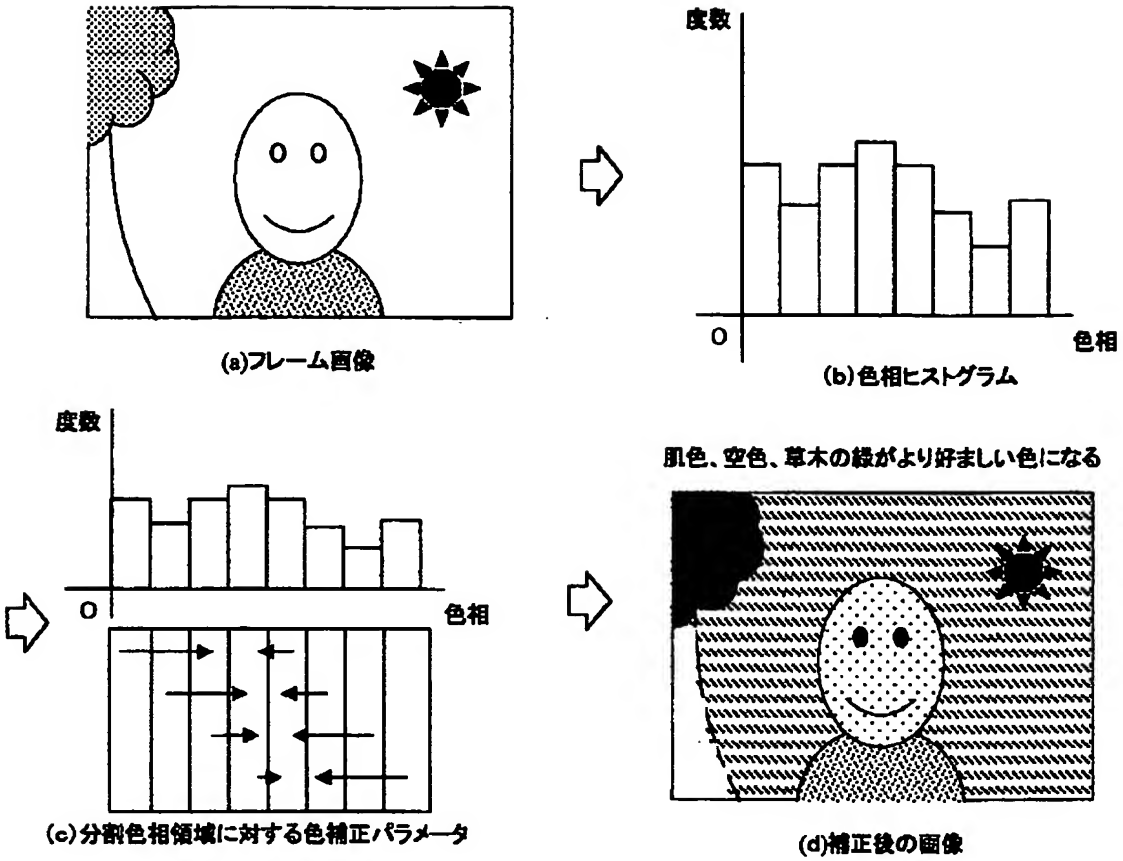
[Drawing 31]



[Drawing 34]



[Drawing 33]



[Translation done.]